# United States Coast Guard

## Office of Navigation Systems

## Providing navigation safety information for America's waterways

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**Office of Navigation Systems**
**U.S. Coast Guard**
**Washington, DC**

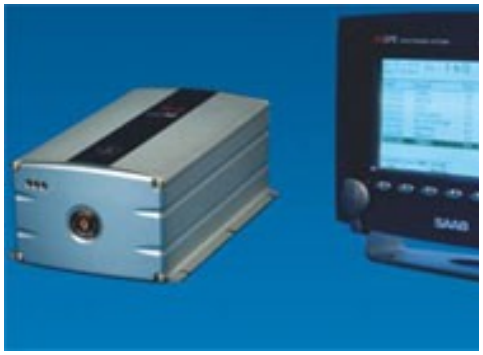
U.S. Army Corp of Engineers & U.S. Coast Guard
**Inland Waterways Conference**
**Cincinnati, OH**
**March 7th, 2007**

Homeland Security

# Automatic Identification System (AIS)

- Why?
- What is it?
- Who has to have it…and will have too?
- How does it work and used?
- Where do we have coverage?
  - Nationwide AIS Project (NAIS)
  - Common Operating Picture (COP)

# Shipboard AIS



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# What started the USCG on AIS?

In 1990, Congress passed the Oil Pollution Act which participation in VTS mandatory and directed the USCG to seek ways to have ‘dependent surveillance’ of all tankers bound for Valdez, Alaska.

To that end, in 1993 the USCG developed *Automated Dependent Surveillance Shipboard Equipment (ADSSE),* based on Digital Selective Calling (DSC) protocol.

# Congress supports/mandates AIS!

In 1997, Congress…stated that AIS "technology should be the foundation of any future VTS system" and that it "strongly believes that this technology will significantly improve navigational safety, not just in select VTS target ports, but throughout the navigable waters of the U.S", and, that we "continue working with stakeholders…"

# Industry endorses AIS!

In 1999, the National Dialog Group, comprised of the marine private and public representatives, stated they:

"strongly endorse the widespread use of AIS employing dGPS and onboard transponder technologies…that national use of AIS technology on the greatest number of vessels is essential both as a foundation of a VTS system…improving navigation safety…strongly urge the USCG to take the lead…in developing equipment and procedural standards that will promote universal use of AIS technology", which will "be less intrusive and distracting to the mariner than will a voice-based control

# AIS Carriage Regulations 33 CFR 164.46

As of December 31st, 2004, the following must have a properly installed, operational, type-approved AIS

- *On international voyage:*
  - ✓ Tankers, Passenger ≥ 150 GT, all others ships ≥ 300 GT
    - ❑ Per SOLAS Regulation V/19.2.4
  - ✓ Self-propelled commercial vessels ≥ 65 feet
    - ❑ Except fishing and passenger vessels (<150 passengers)
- *Within a VTS area:*
  - ✓ Self-propelled commercial vessels ≥ 65 feet
    - ❑ Except fishing and passenger vessels (<150 passengers)
  - ✓ Towing vessel ≥ 26 feet and ≥ 600 hp
  - ✓ Vessel certificated to carry ≥ 150 passengers

# What is AIS?

- *Autonomous Continuous Station-to-Station Navigation Broadcast System*
  - 3 modes of operation: automatic/self-reporting, assigned, interrogation/polling
  - Open protocol & non-proprietary
  - Robust capability: can handle up to 4500 reports per minute
  - Frequency agile: any 2 channels in the VHF Marine Band
  - Versatile: multiple standard interfaces and display options
- *Internationally Adopted & Required (IMO SOLAS Regulation V/19.2.4)*
  - Tankers, passenger vessels, and, other ships 300 of gross tonnage or greater
    - Purpose: collision avoidance, vessel traffic service tool, and, coastal surveillance
- *Mandated by Congress by the Marine Transportation & Security Act of 2002*
  - Commercial self-propelled vessels 65 feet or greater;
  - Towing Vessels over 26 feet or greater and 600 hp or more;
  - Passenger vessels as determined by USCG; and

# Forthcoming AIS Rule

- Announcement published October 31st, 2005
- Extend to all U.S. navigable waters
- Potentially could effect 17,000 vessels.
  - Commercial self-propelled vessel of ≥ 65 feet
    - **No exceptions**
  - Towing vessel ≥ 26 feet and > 600 hp
  - Vessels carrying ≥ **50** passengers (vice 150)
  - **Hi-Speed vessels carry ≥ 12 passengers**
  - **Certain dredges / floating plants, and**
  - **Vessel moving certain dangerous cargoes**
- Forthcoming rulemaking will address timeline
  - Reasonable time will be given for installation/use

| Estimated Expanded AIS Population | |
|---|---|
| **Ships** ≥65ft | **2,973** |
| **Freight Ship** | 298 |
| **Industrial Ship** | 748 |
| **MODU** | 210 |
| **OSV** | 553 |
| **Research Vessel** | 97 |
| **School Ship** | 19 |
| **Tank Ship** | 122 |
| **Unclassified** | 385 |
| **Unknown** | 541 |
| **Fishing** ≥65ft | **5,520** |
| Documented | 4,571 |
| Undocumented (est.) | 949 |
| **Towing** ≥26ft & ≥600hp | **4,560** |
| **Passenger** | **3,235** |
| ≥65ft | 2,167 |
| <65' but ≥50 pax | 1,062 |
| >30kts & >12 pax for hire | 6 |
| **Dredges** | **35** |
| **Total (U.S.)** | **16,323** |
| **Foreign Flag** ≥65ft | **1,119** |
| **Total (All)** | **17,442** |

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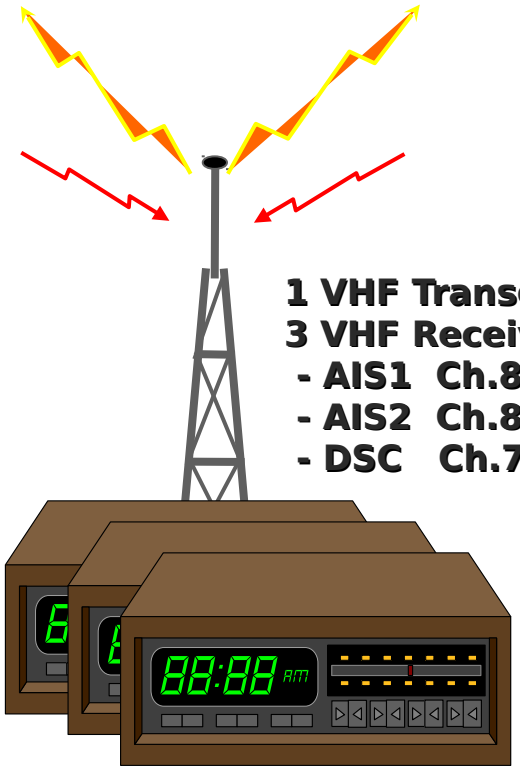
# AIS how…

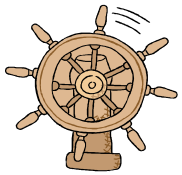
Time-Division Multiple Access (TDMA)



**1 VHF Transceiver**
**3 VHF Receivers**
**- AIS1 Ch.87B**
**- AIS2 Ch.88B**
**- DSC Ch.70**

**GNSS**
**dGPS**

**Inputs**



**Gyro/Heading**
**Rate of Turn**
**per SOLAS requirements**

←!AIVDM,2,2,7,A,2220<5<PTq2r7P2222220p4q@T<tdE2r`P0,2*4E…

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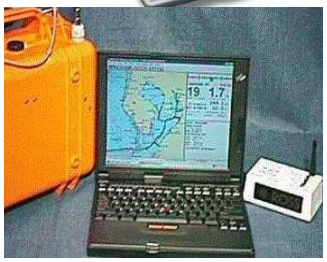

## COMMUNICATE

Broadcasts and manages the flow of AIS data sentences

## ASSEMBLE

Gathers positioning, heading, vessel data and assembles it into an AIS compliant data sentences

## READ

AIS data sentences may be read/sent on/to multiple devices

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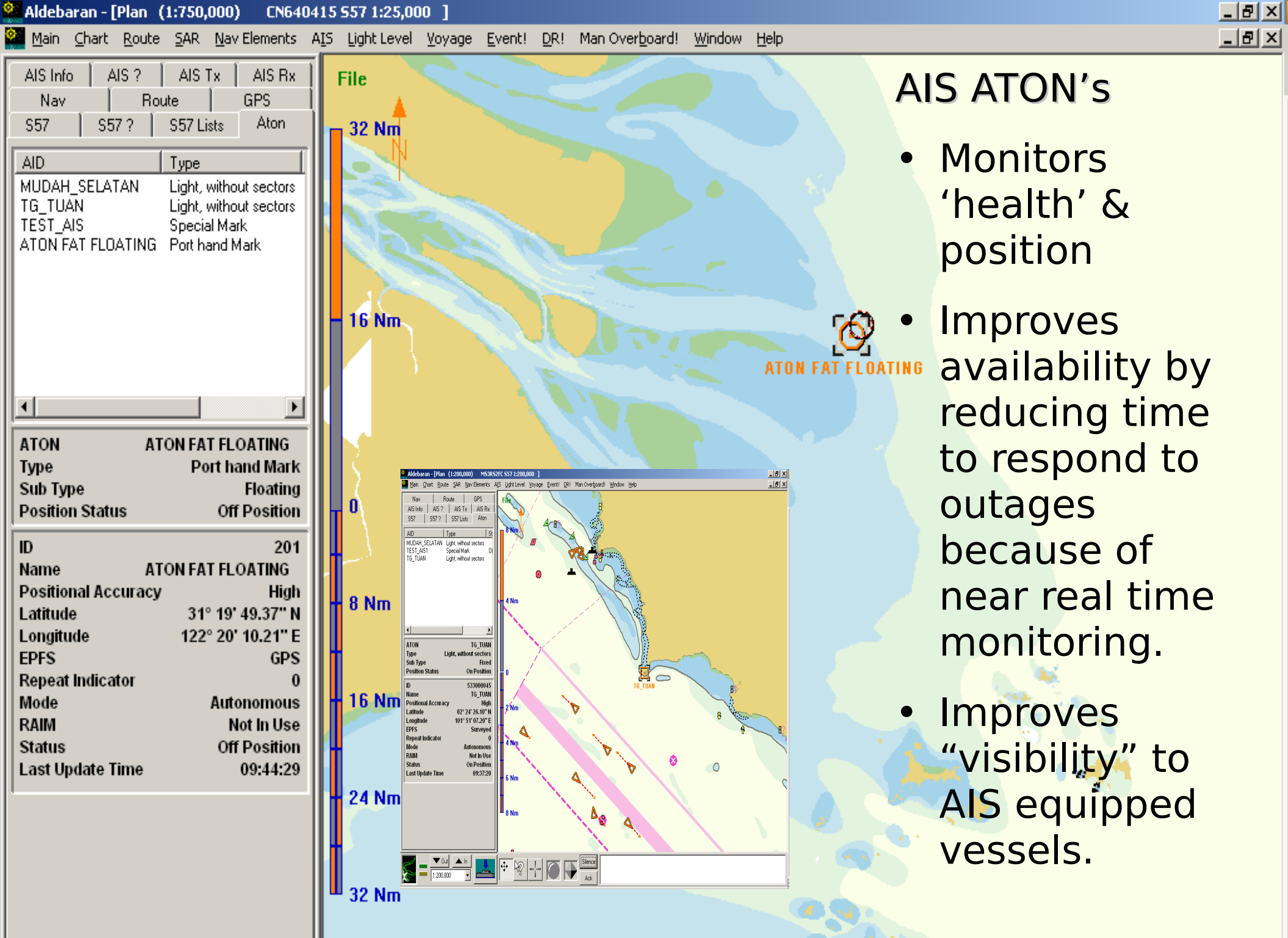
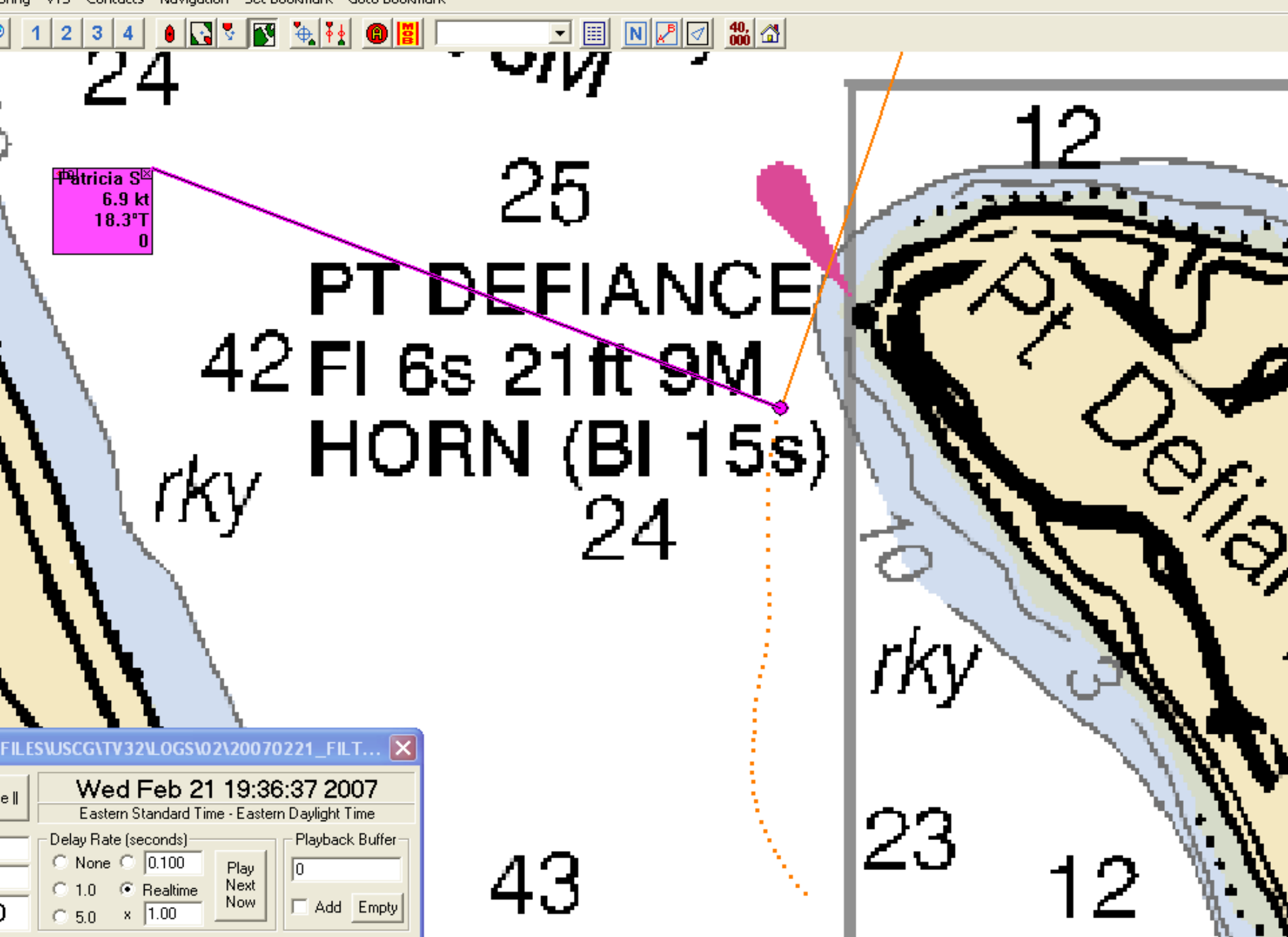



# AIS ATON's

- Monitors 'health' & position
- Improves availability by reducing time to respond to outages because of near real time monitoring.
- Improves "visibility" to AIS equipped vessels.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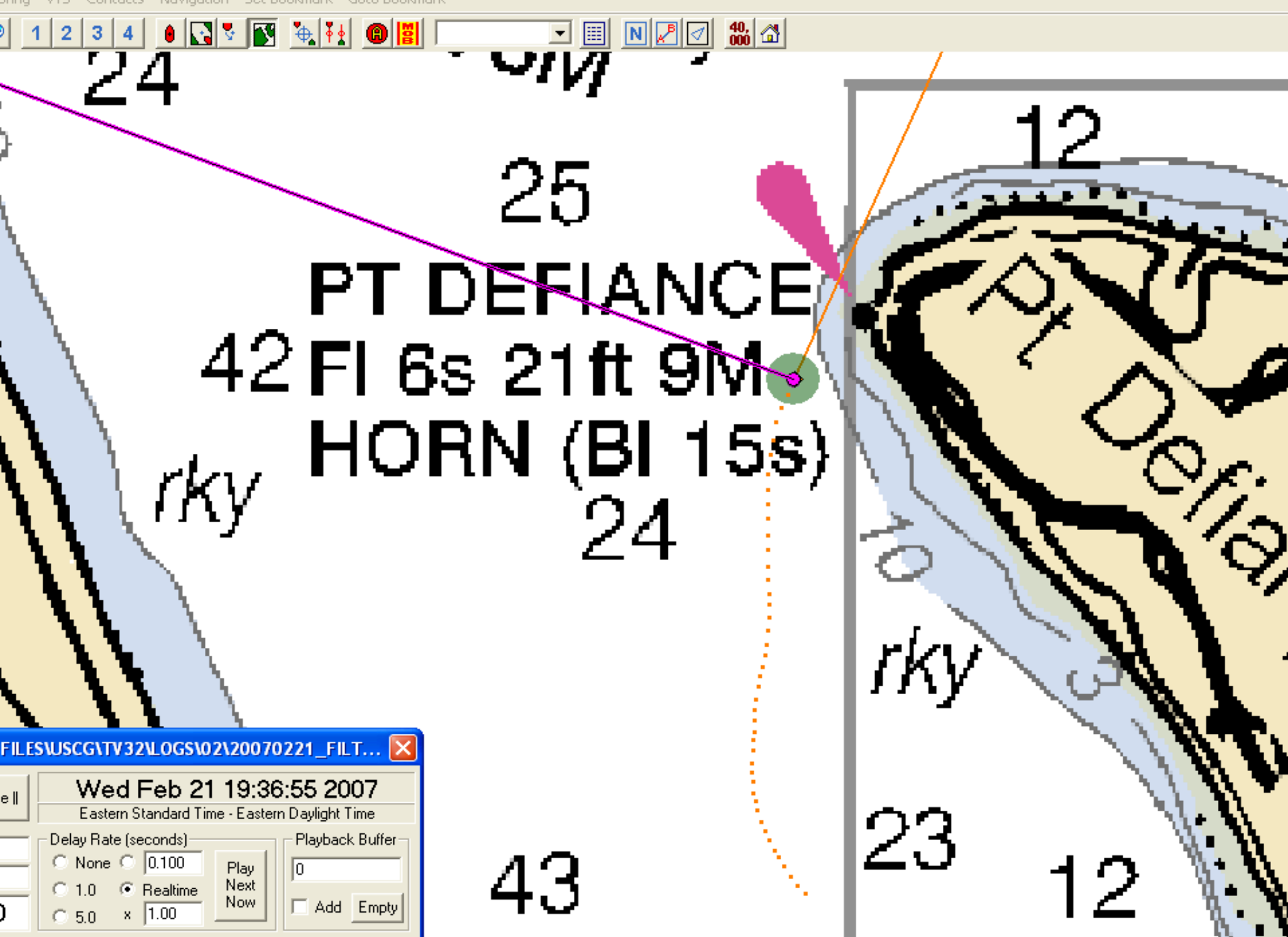
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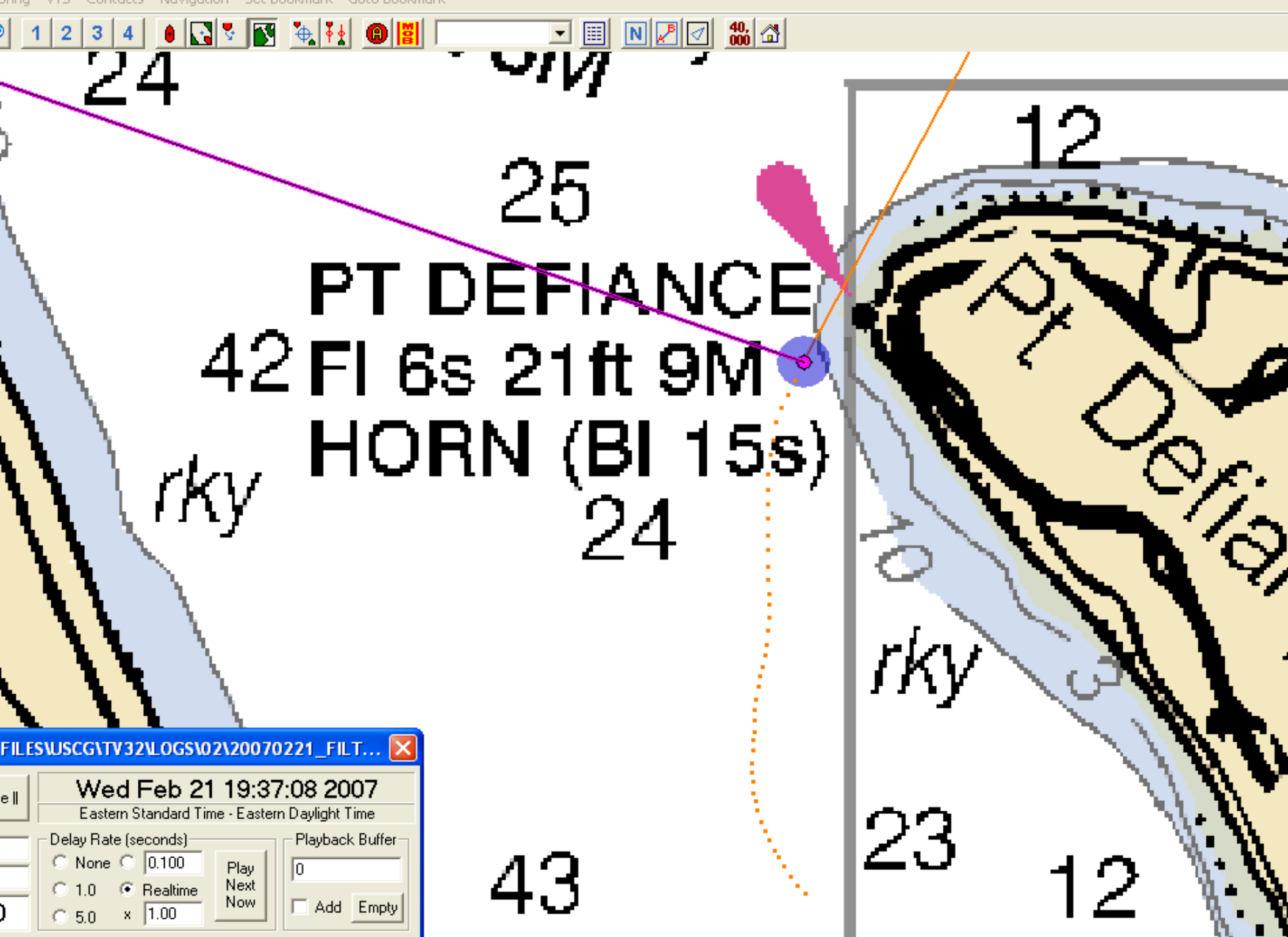
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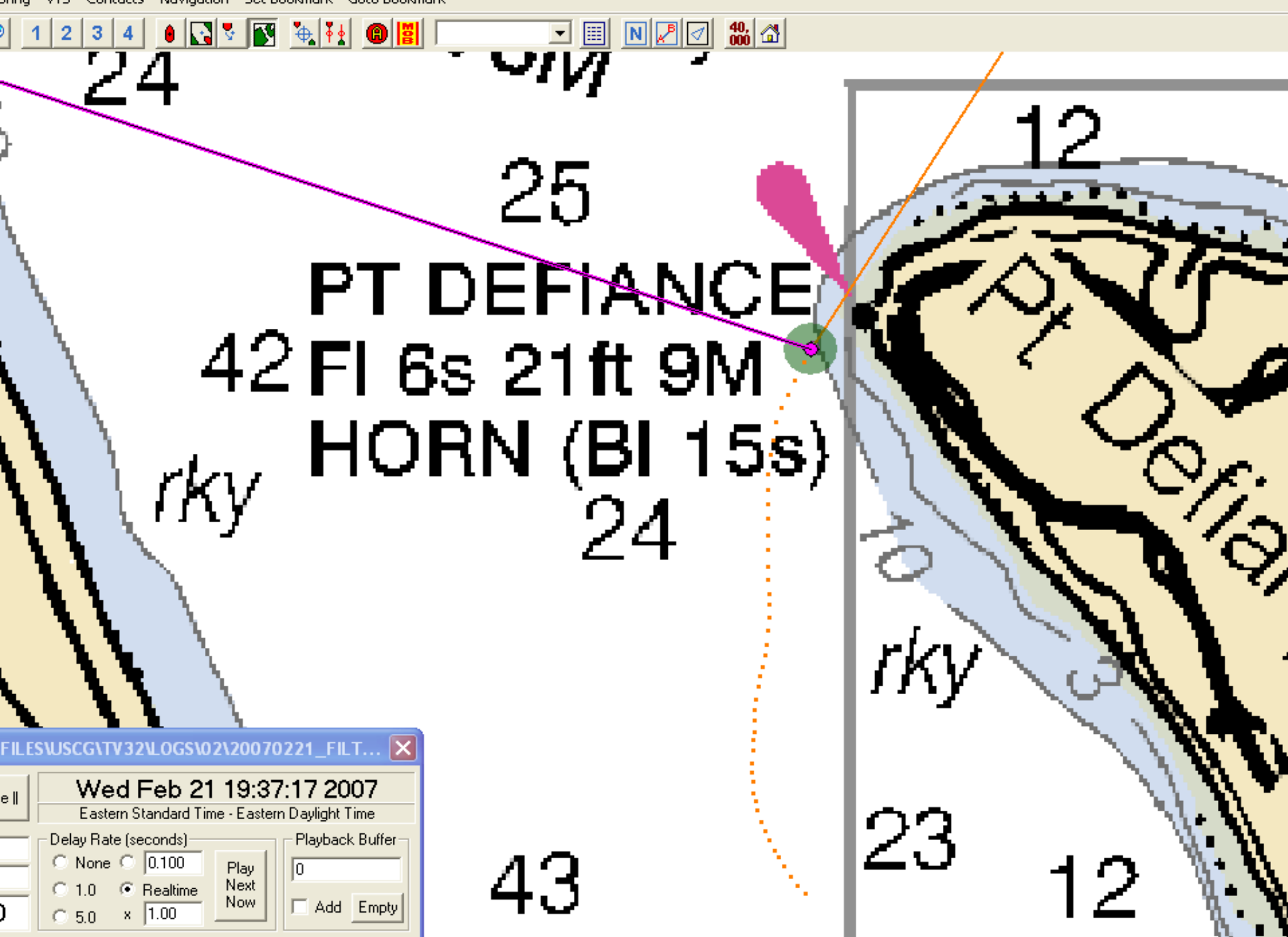
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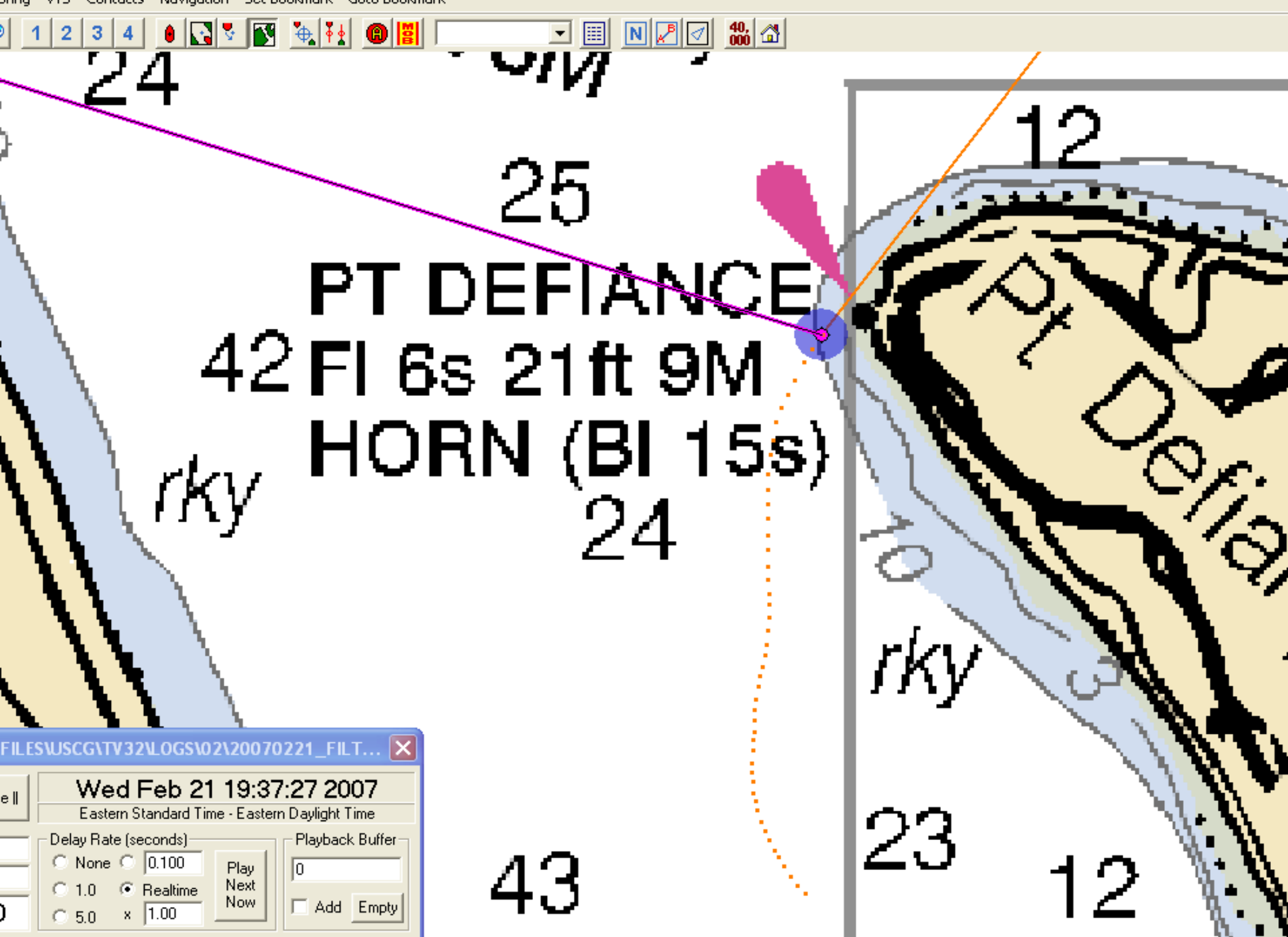
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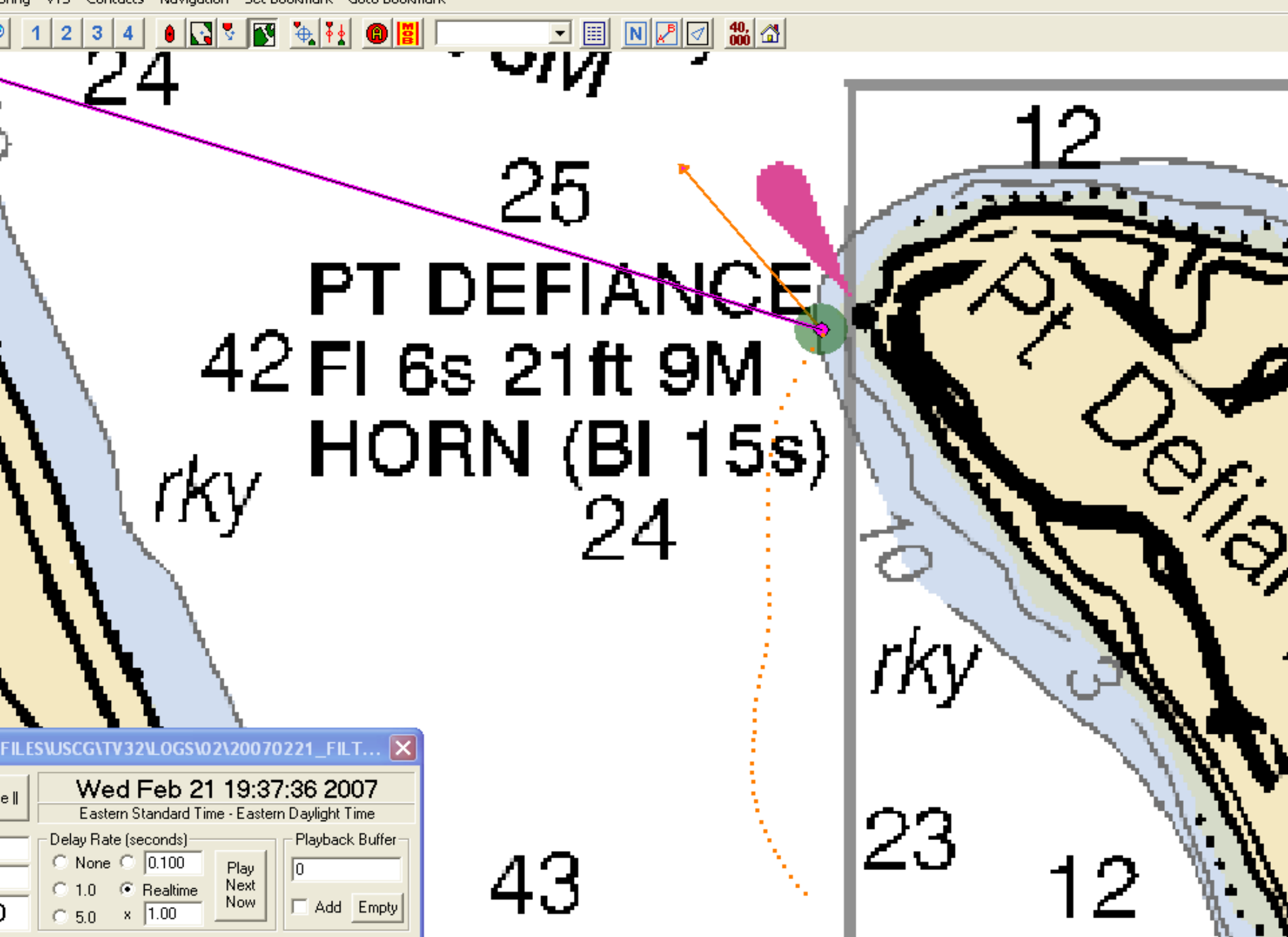
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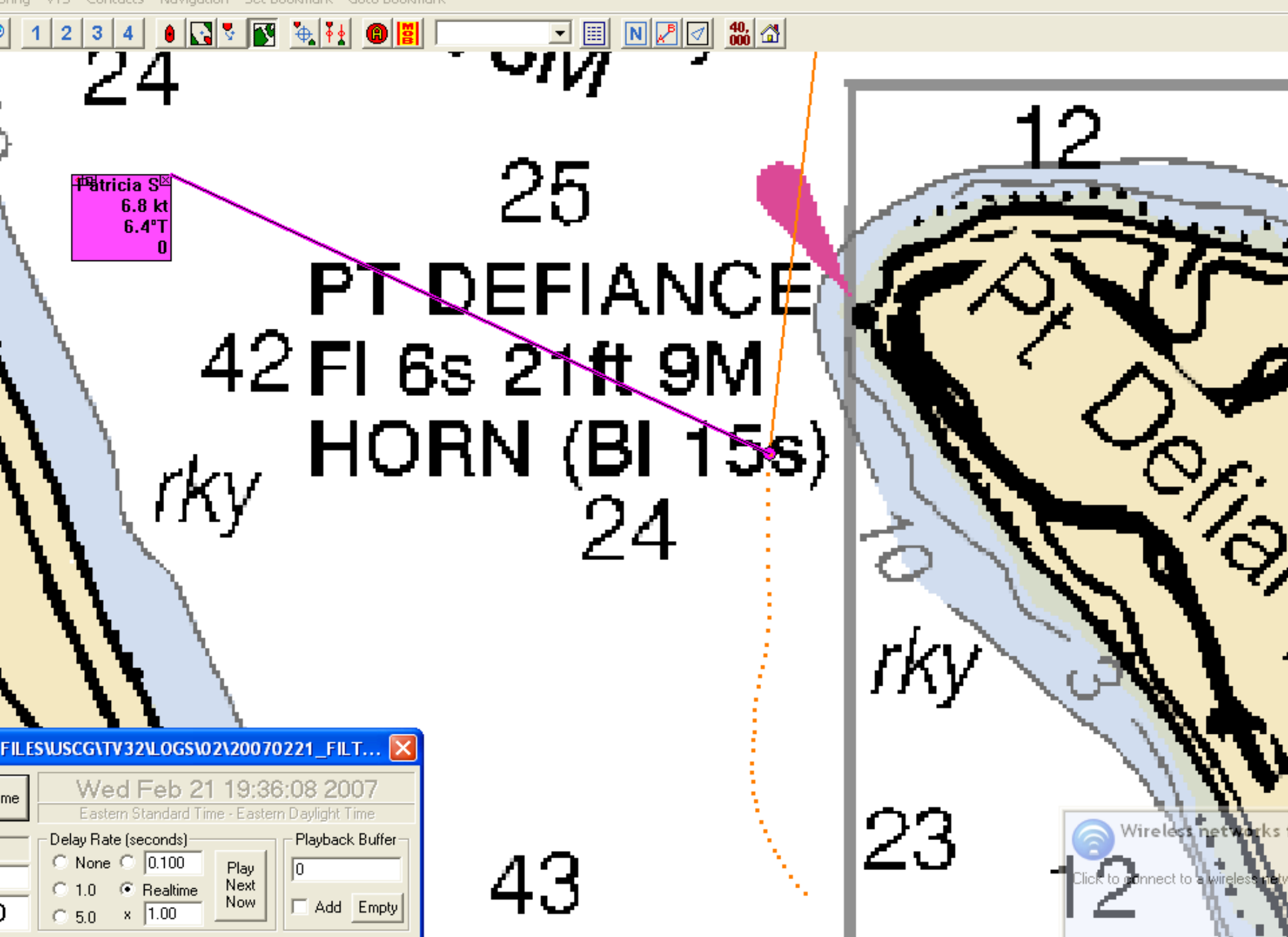
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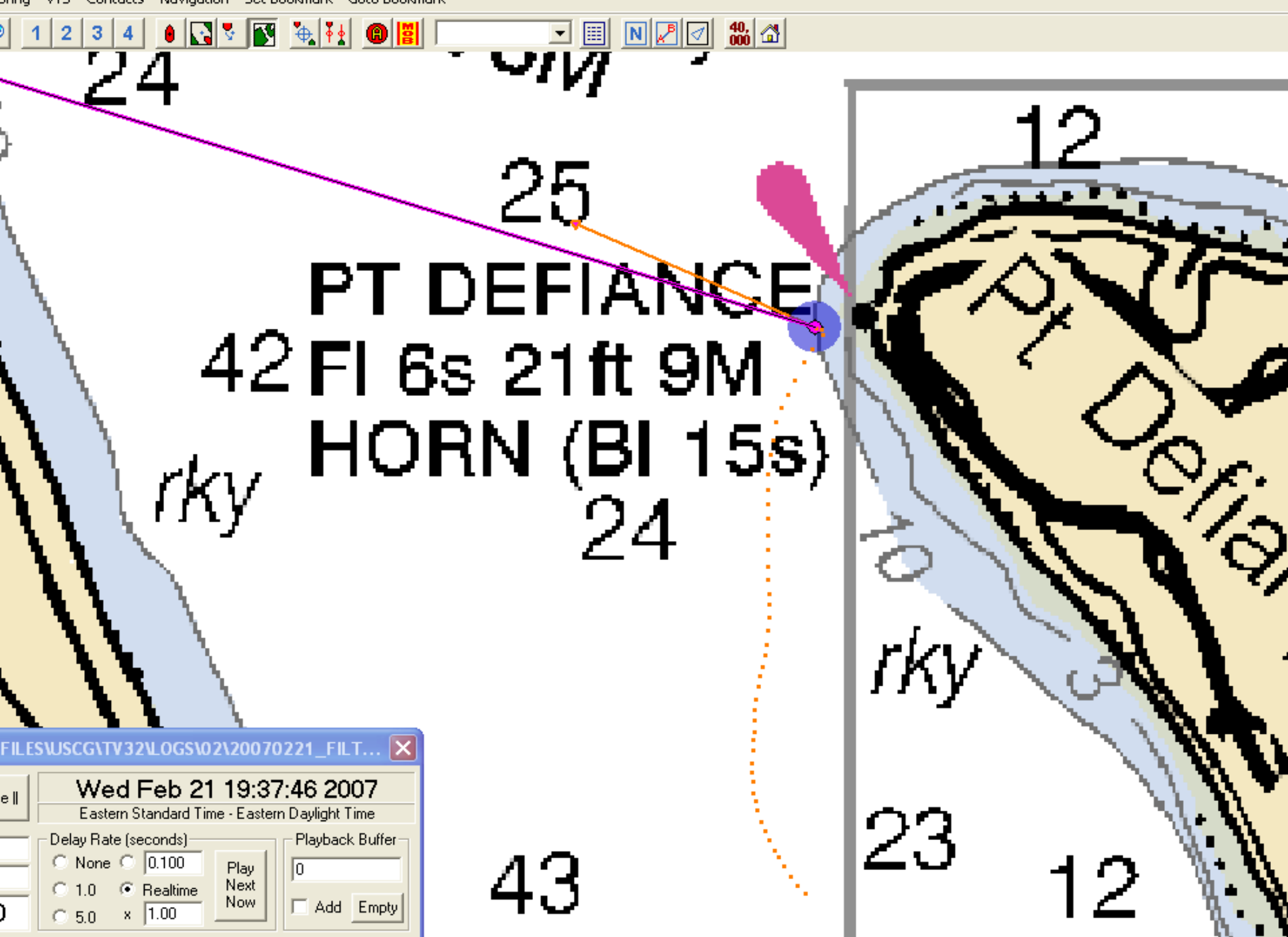
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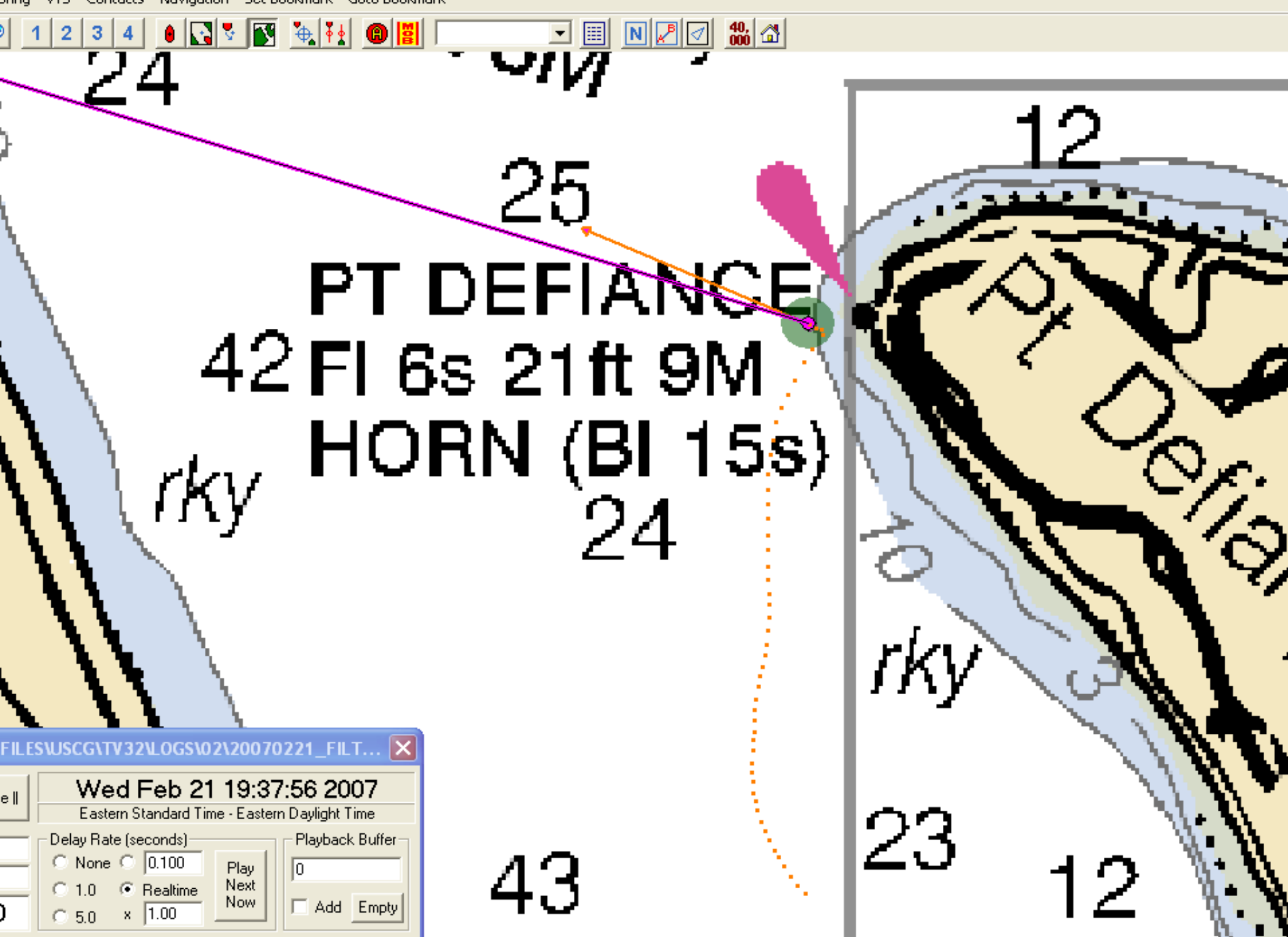
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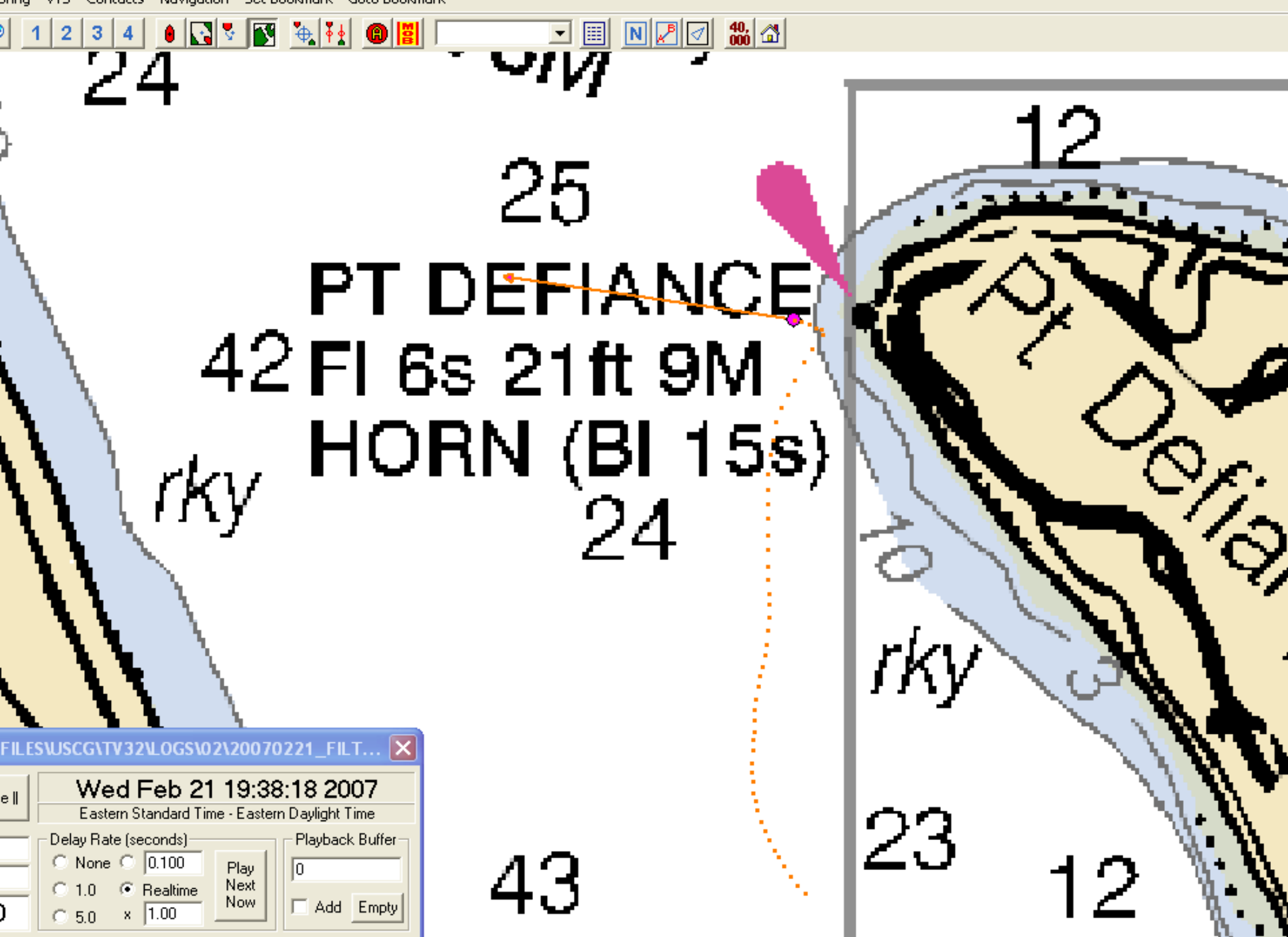
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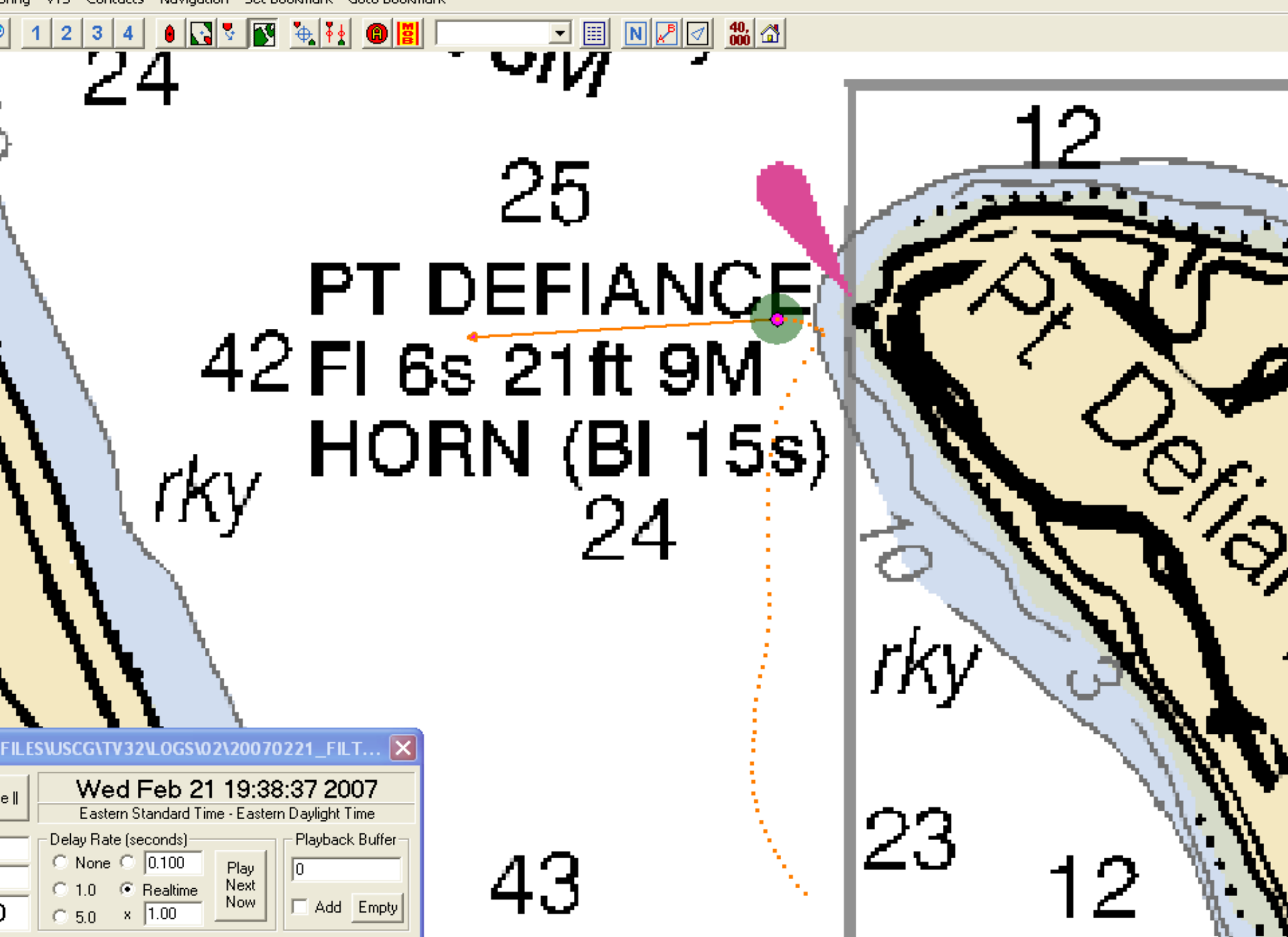
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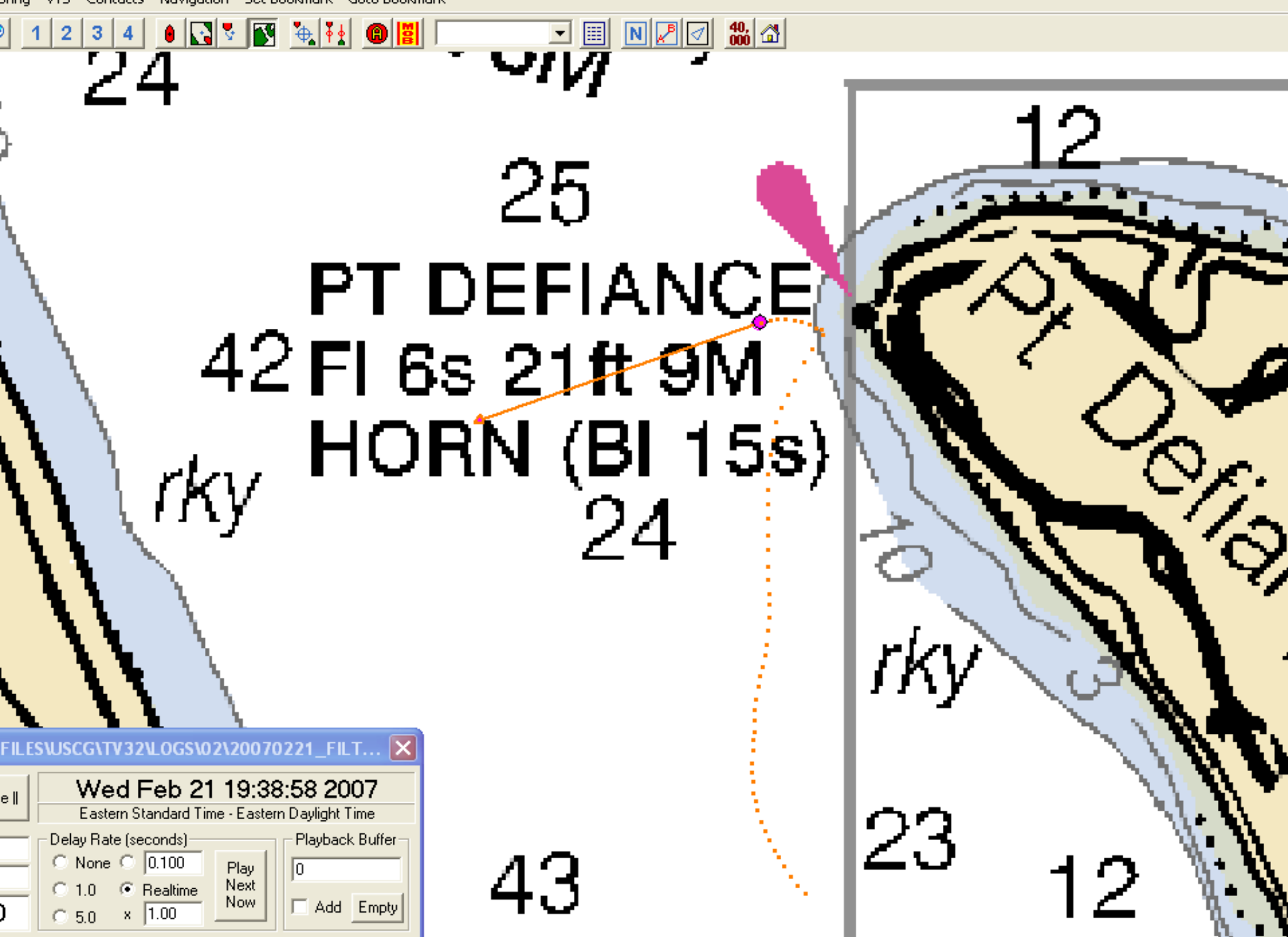
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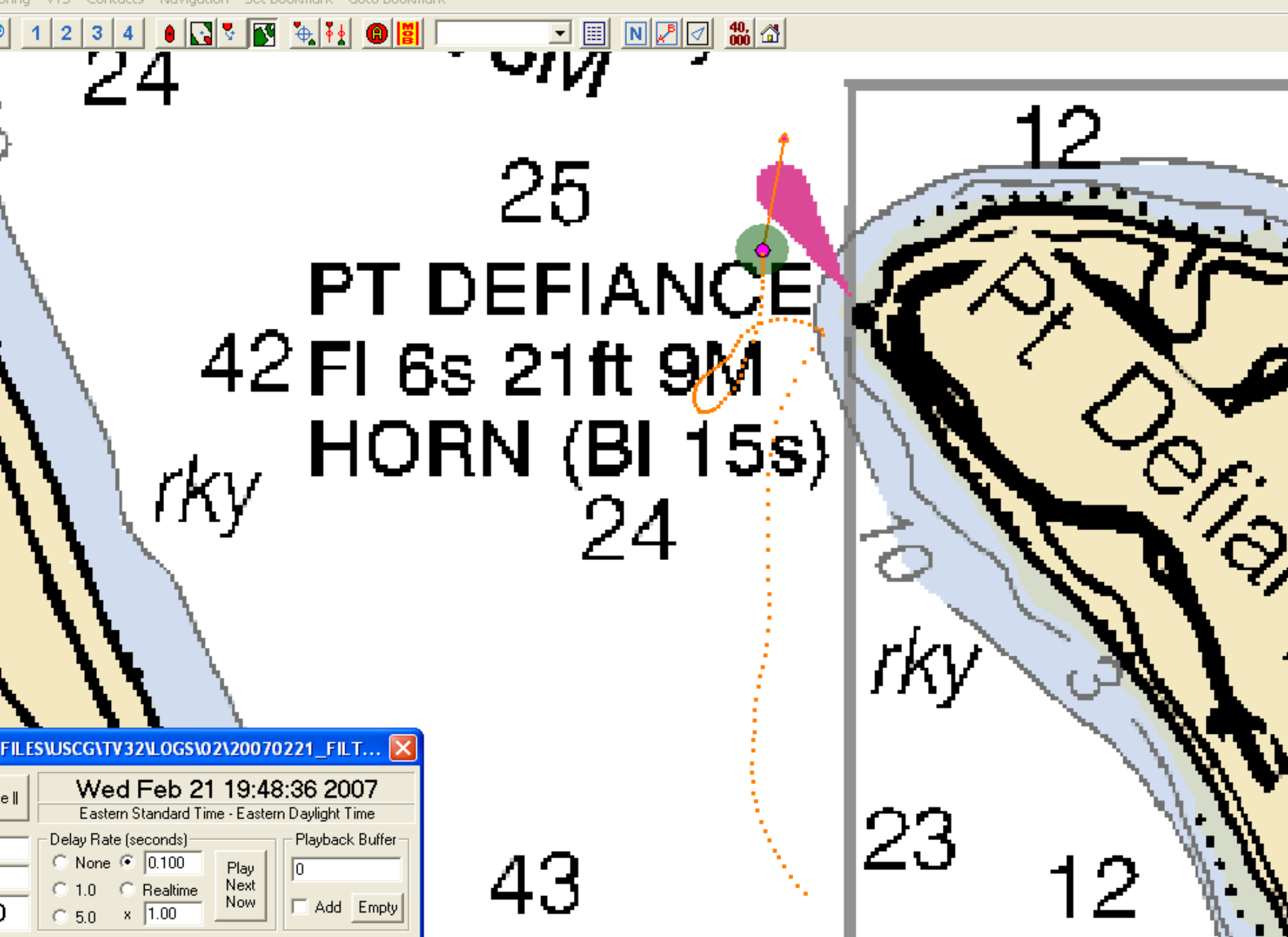
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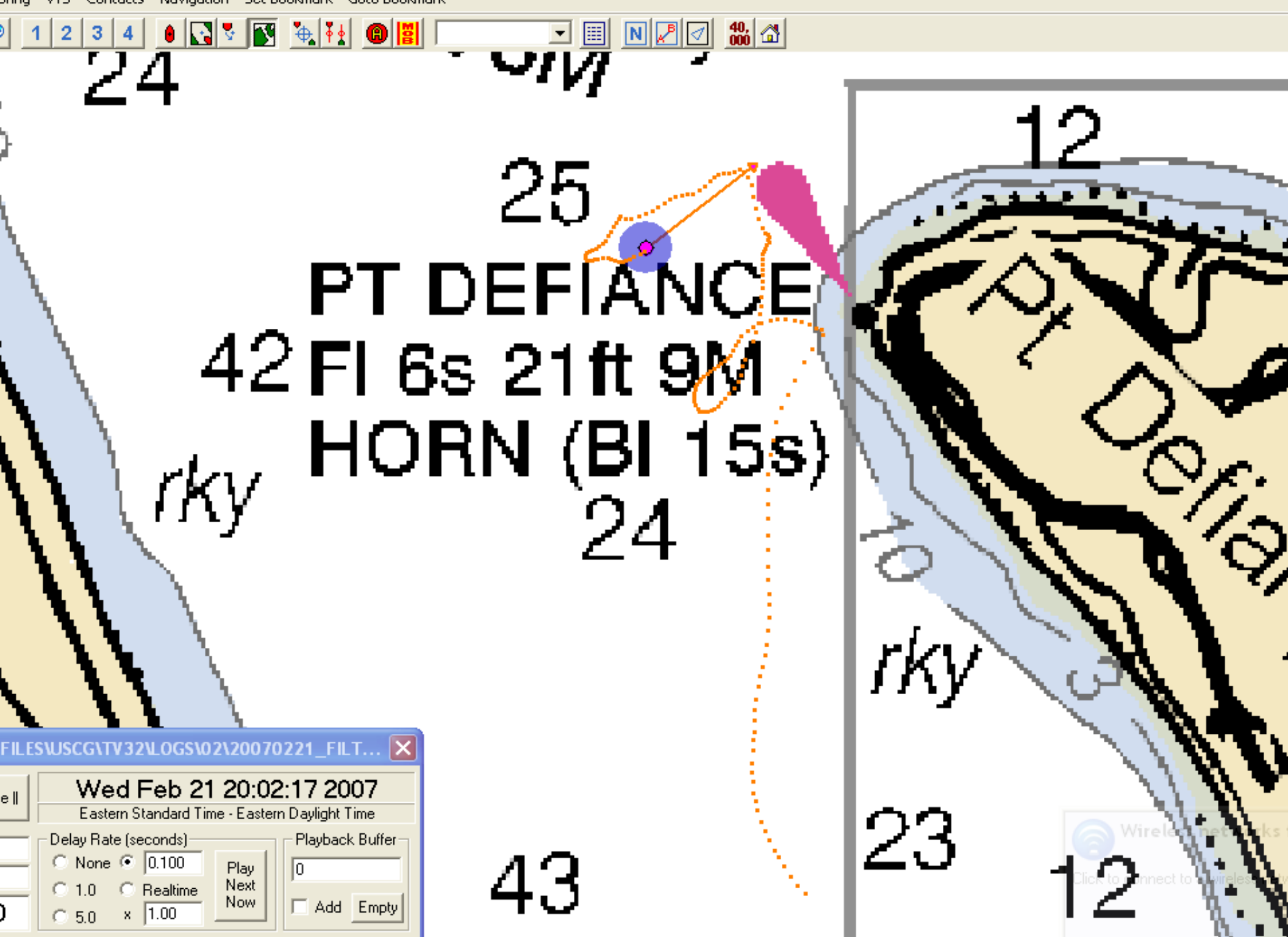
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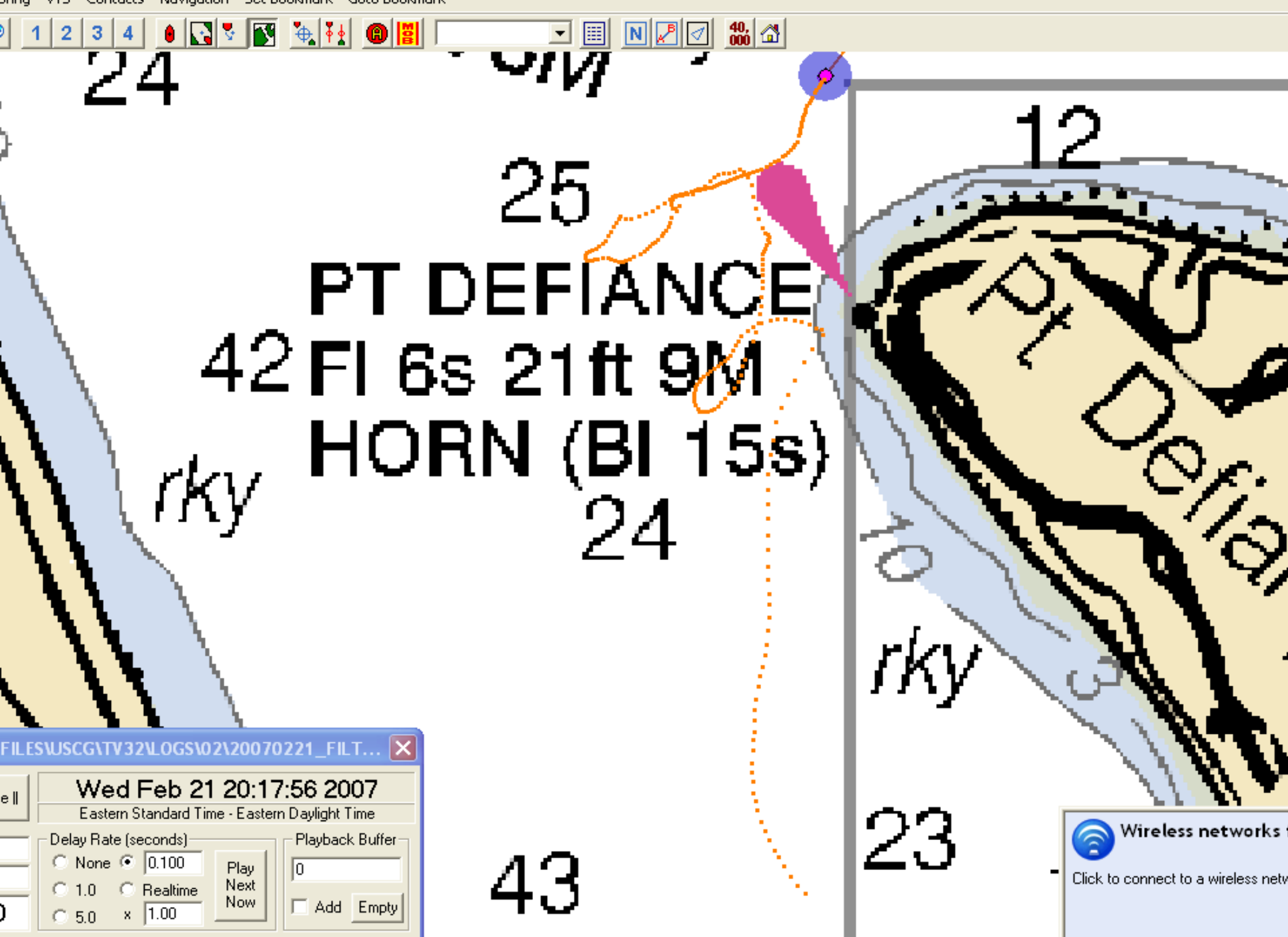
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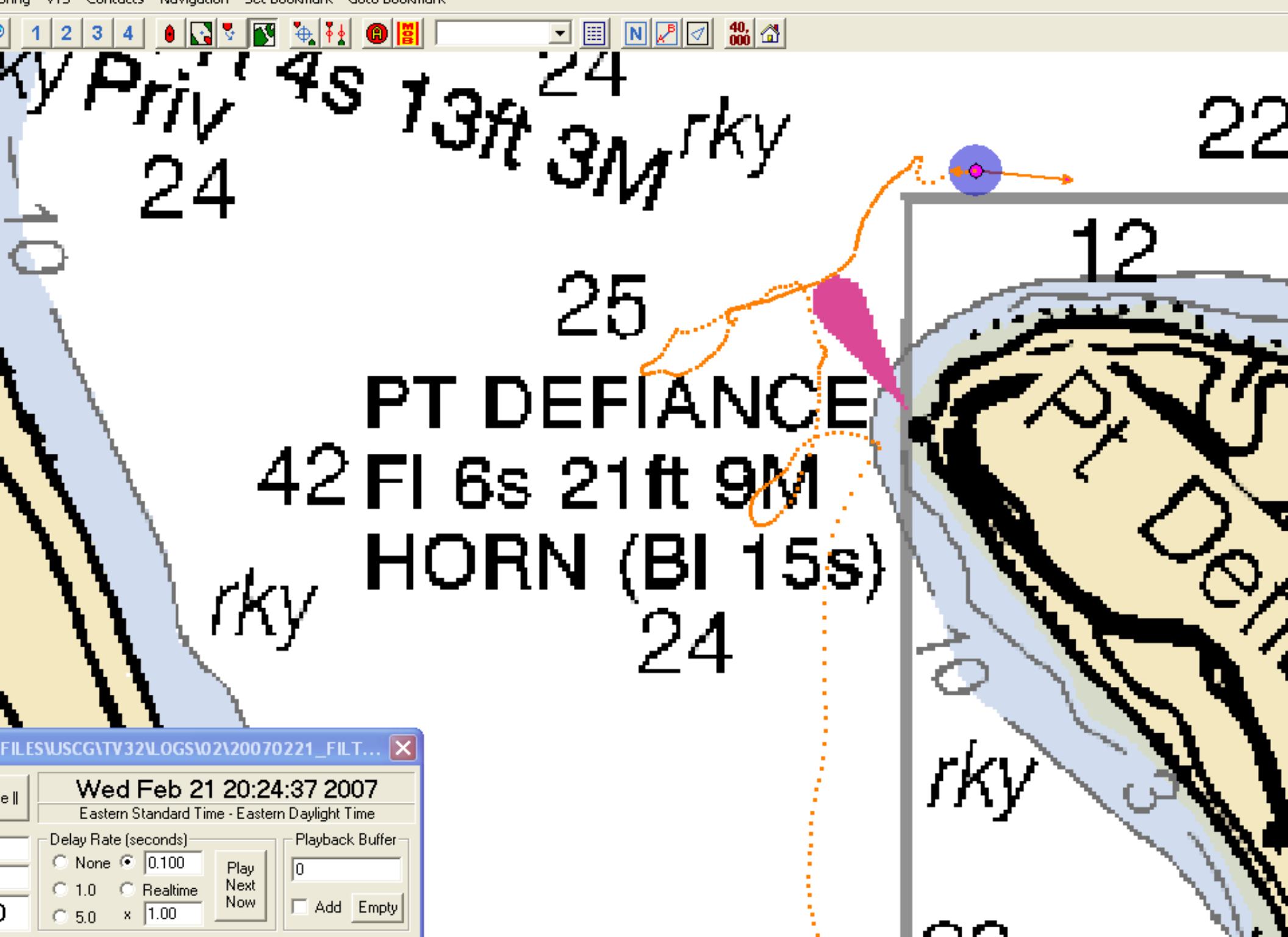
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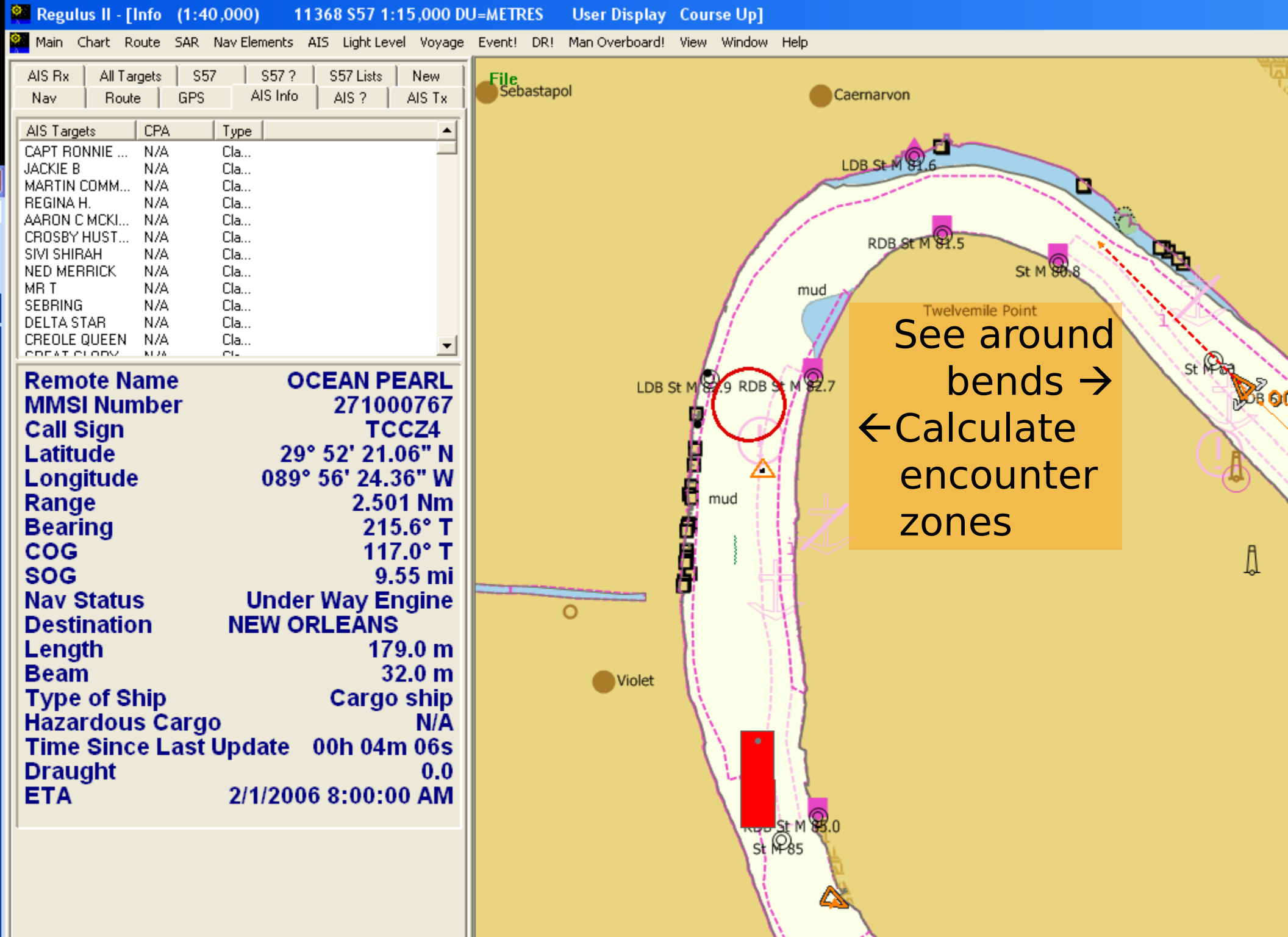
# Vessel Name – Bearing - Range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AIS Rx All Targets S57 S57 ? S57 Lists New
Nav Route GPS AIS Info AIS ? AIS Tx
AIS Targets CPA Type
CAPT RONNIE ... N/A Cla...
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MARTIN COMM... N/A Cla...
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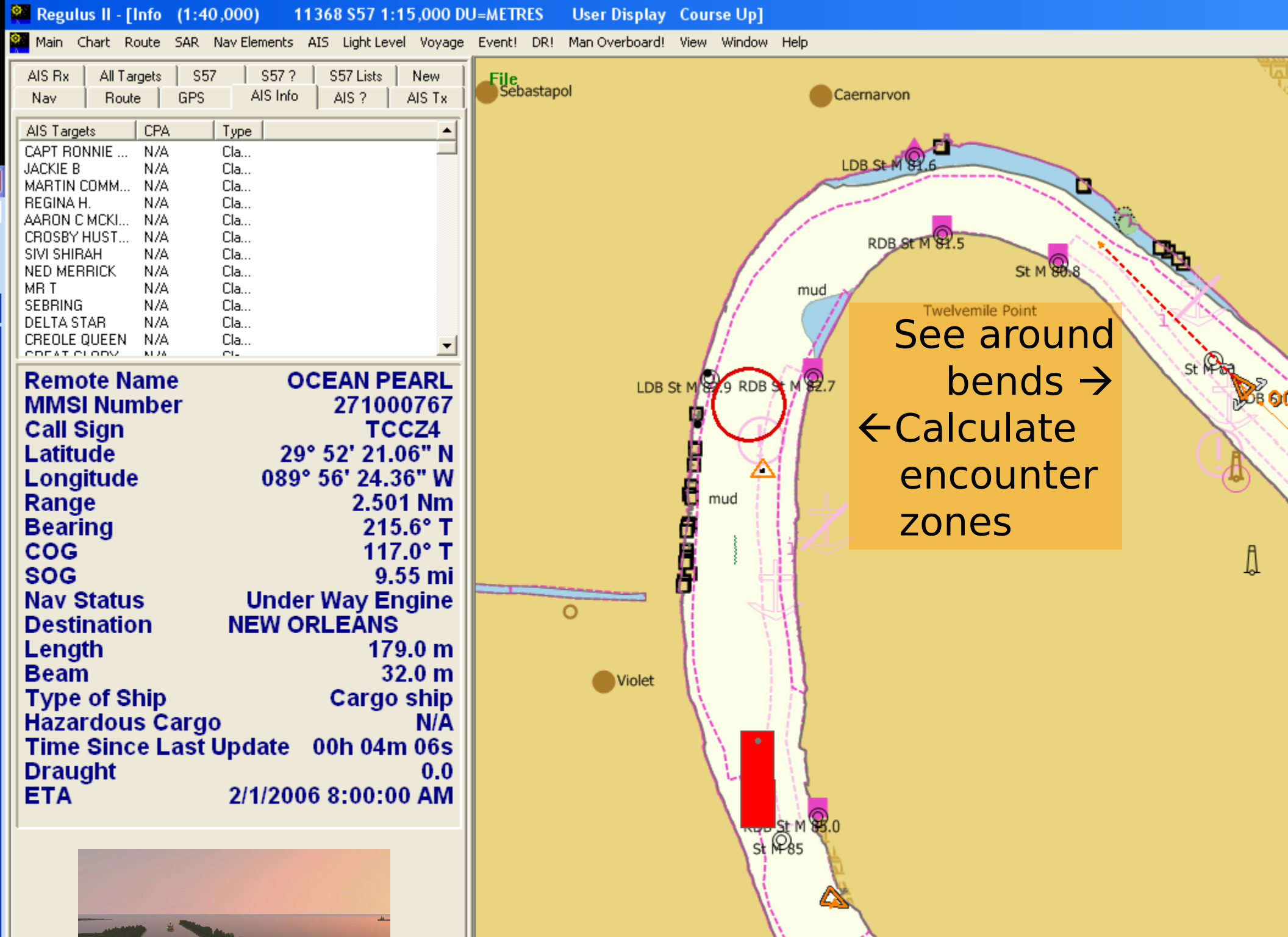
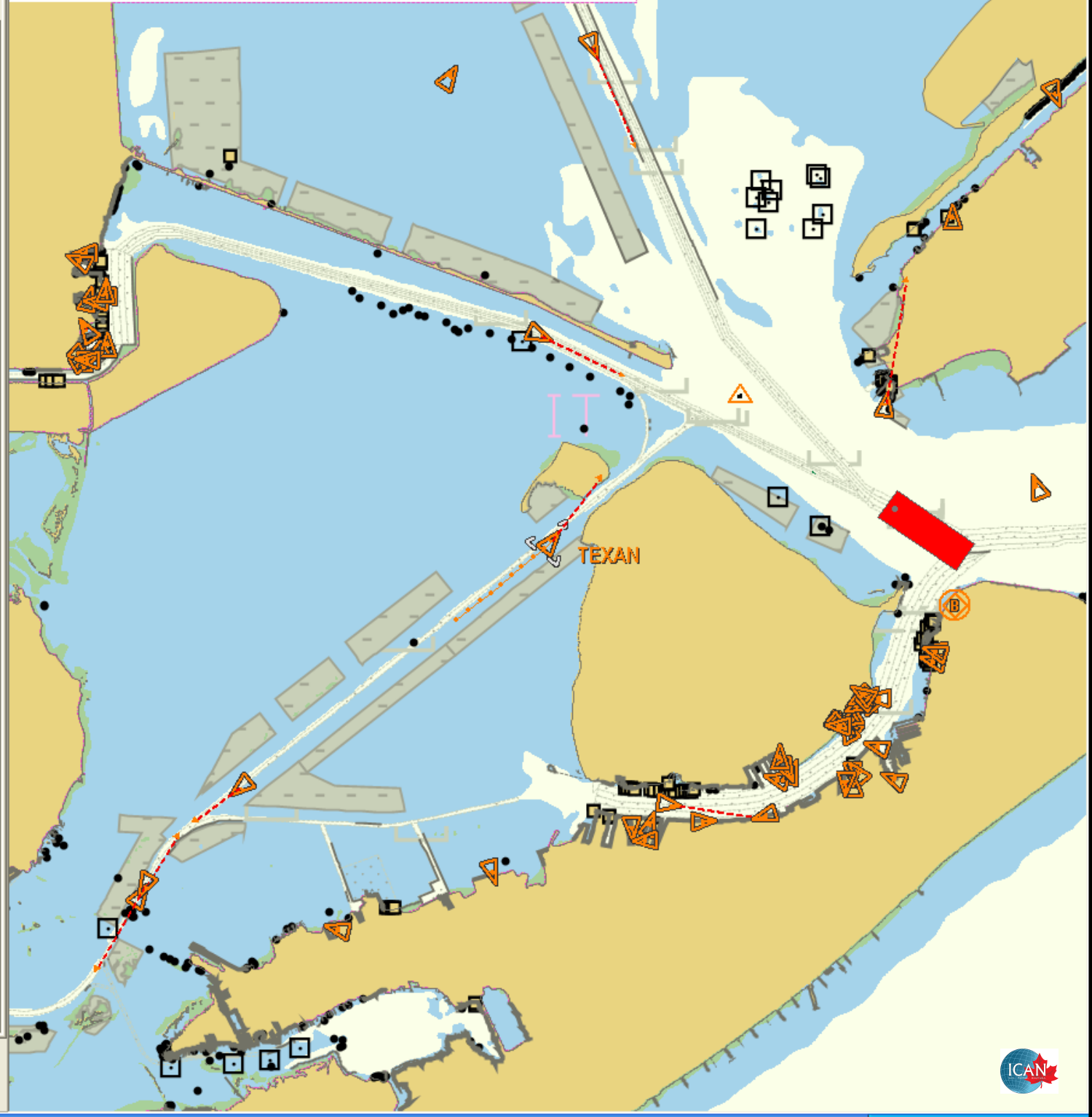
See around bends →
←Calculate encounter zones


Regulus II - [Info (1:40,000) 11368 S57 1:15,000 DU=METRES User Display Course Up]
Main Chart Route SAR Nav Elements AIS Light Level Voyage Event! DR! Man Overboard! View Window Help
AIS Rx All Targets S57 S57 ? S57 Lists New
Nav Route GPS AIS Info AIS ? AIS Tx
AIS Targets CPA Type
CAPT RONNIE ... N/A Cla...
JACKIE B N/A Cla...
MARTIN COMM... N/A Cla...
REGINA H. N/A Cla...
AARON C MCKI... N/A Cla...
CROSBY HUST... N/A Cla...
SIVI SHIRAH N/A Cla...
NED MERRICK N/A Cla...
MR T N/A Cla...
SEBRING N/A Cla...
DELTA STAR N/A Cla...
CREOLE QUEEN N/A Cla...
Remote Name OCEAN PEARL
MMSI Number 271000767
Call Sign TCCZ4
Latitude 29° 52' 21.06" N
Longitude 089° 56' 24.36" W
Range 2.501 Nm
Bearing 215.6° T
COG 117.0° T
SOG 9.55 mi
Nav Status Under Way Engine
Destination NEW ORLEANS
Length 179.0 m
Beam 32.0 m
Type of Ship Cargo ship
Hazardous Cargo N/A
Time Since Last Update 00h 04m 06s
Draught 0.0
ETA 2/1/2006 8:00:00 AM
File
Sebastapol
Caernarvon
LDB St M 81.6
RDB St M 81.5
St M 80.8
mud
Twelvemile Point
LDB St M 82.9
RDB St M 82.7
mud
Violet
St M 85
See around bends →
←Calculate encounter zones

Nav | Route | GPS | AIS Info | AIS ? | AIS Tx

| AIS Targets | CPA | Type |
|---|---|---|
| OTTO CANDIES | 01:16:21 | Cla... |
| DAVIDSON | N/A | Cla... |
| TRACIE L | N/A | Cla... |
| WALTER D NU... | 01:18:18 | Cla... |
| GALTEX | N/A | Cla... |
| SEA HERO | N/A | Cla... |
| VIKING | N/A | Cla... |
| MOBILIAN | N/A | Cla... |
| PAT MCDANIEL | 01:42:01 | Cla... |
| SAN PATRICIO | 01:15:36 | Cla... |
| SUSANNAH_G... | 01:19:29 | Cla... |
| ROBYN S | 03:16:13 | Cla... |

| | |
|---|---|
| **Remote Name** | **TEXAN** |
| **MMSI Number** | **366904340** |
| **Call Sign** | **WDB4969** |
| **Latitude** | **29° 20' 33.95" N** |
| **Longitude** | **094° 49' 36.58" W** |
| **Range** | **2.542 Nm** |
| **Bearing** | **264.8° T** |
| **COG** | **037.9° T** |
| **SOG** | **6.90 mi** |
| **Nav Status** | **Under Way Engine** |
| **Destination** | **N/A** |
| **Length** | **16.0 m** |
| **Beam** | **8.0 m** |
| **Type of Ship** | **Tug** |
| **Hazardous Cargo** | **N/A** |
| **Time Since Last Update** | **00h 01m 15s** |
| **Draught** | **0.0** |
| **ETA To Destination** | **N/A** |



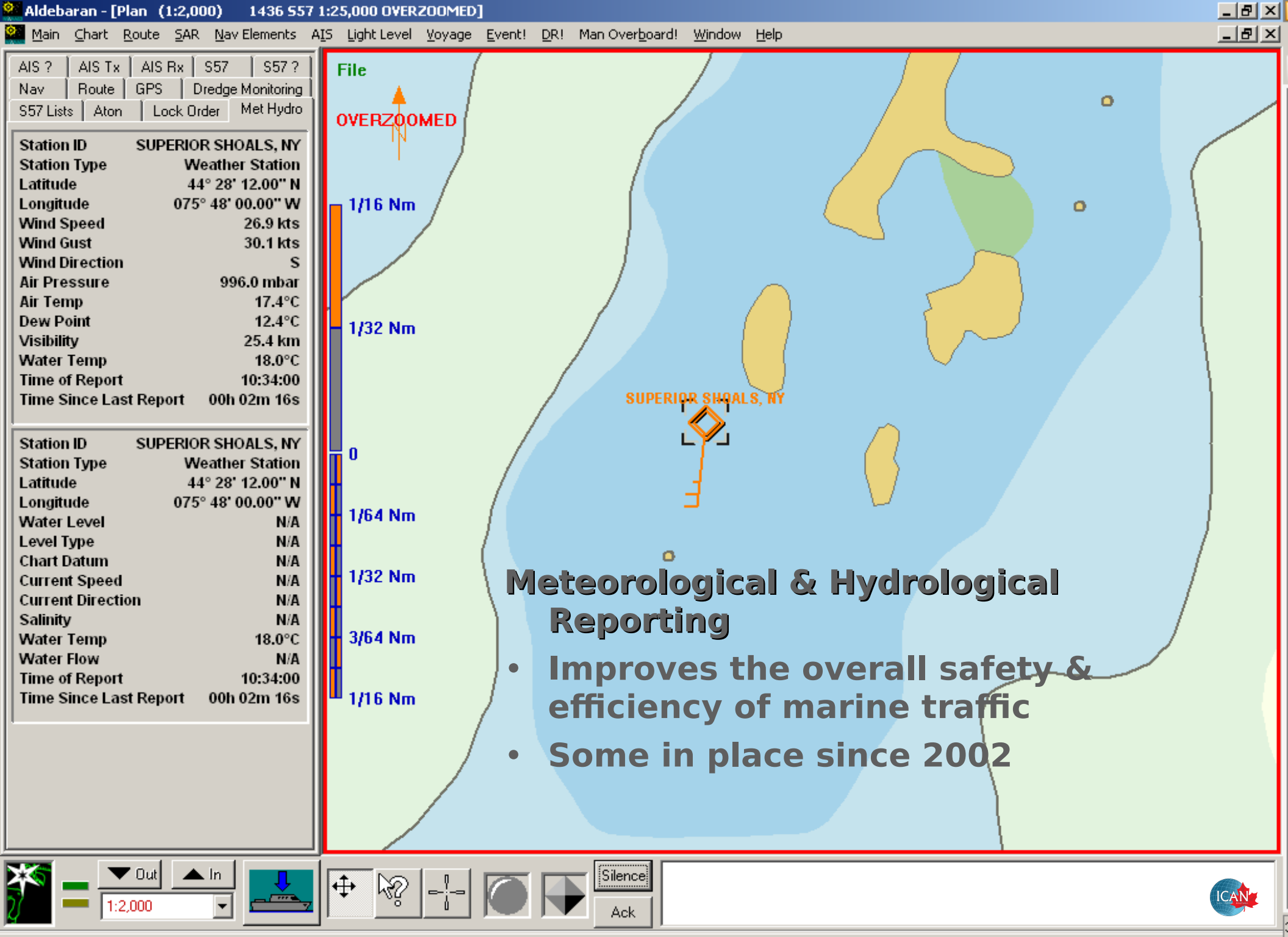
# Binary Messages and Functional Identifier

*AIS allows the transfer of Binary Messages*

- a means for communication for external applications
  - General broadcast
  - Addressed to specific station (MMSI)
    - Results in a Binary Acknowledgement to confirm that the addressed binary message was received

*All binary messages are composed by*

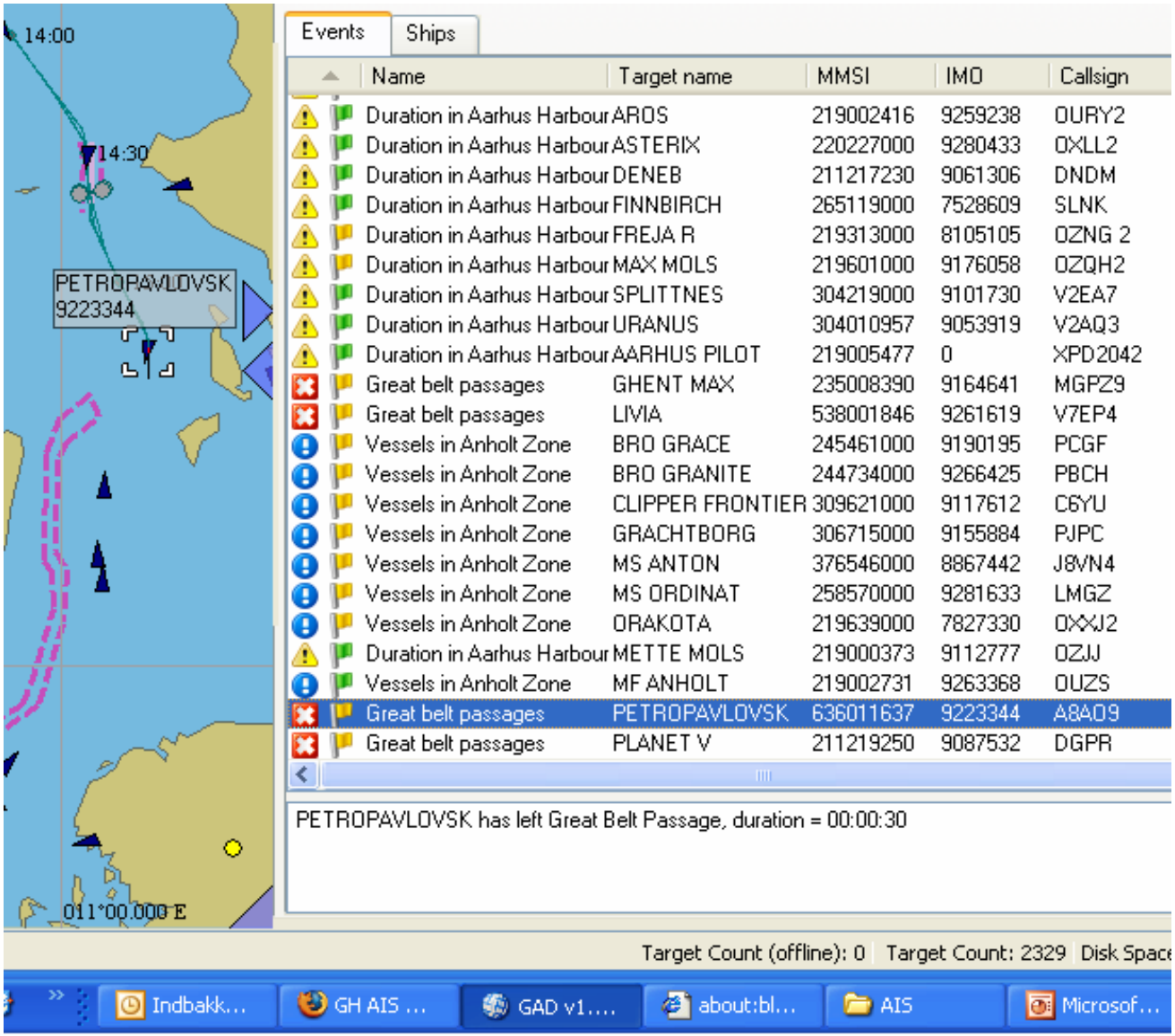
- an external application on the transmission side
- can only be used by the same external application connected to the AIS on the receiver side.




## Meteorological & Hydrological Reporting

- Improves the overall safety & efficiency of marine traffic
- Some in place since 2002

# AIS Event Detection


14:00
14:30
PETROPAVLOVSK
9223344
011°00.000 E
Events
Ships
Name
Target name
MMSI
IMO
Callsign
Duration in Aarhus Harbour AROS 219002416 9259238 OURY2
Duration in Aarhus Harbour ASTERIX 220227000 9280433 OXLL2
Duration in Aarhus Harbour DENEB 211217230 9061306 DNDM
Duration in Aarhus Harbour FINNBIRCH 265119000 7528609 SLNK
Duration in Aarhus Harbour FREJA R 219313000 8105105 OZNG 2
Duration in Aarhus Harbour MAX MOLS 219601000 9176058 OZQH2
Duration in Aarhus Harbour SPLITTNES 304219000 9101730 V2EA7
Duration in Aarhus Harbour URANUS 304010957 9053919 V2AQ3
Duration in Aarhus Harbour AARHUS PILOT 219005477 0 XPD2042
Great belt passages GHENT MAX 235008390 9164641 MGPZ9
Great belt passages LIVIA 538001846 9261619 V7EP4
Vessels in Anholt Zone BRO GRACE 245461000 9190195 PCGF
Vessels in Anholt Zone BRO GRANITE 244734000 9266425 PBCH
Vessels in Anholt Zone CLIPPER FRONTIER 309621000 9117612 C6YU
Vessels in Anholt Zone GRACHTBORG 306715000 9155884 PJPC
Vessels in Anholt Zone MS ANTON 376546000 8867442 J8VN4
Vessels in Anholt Zone MS ORDINAT 258570000 9281633 LMGZ
Vessels in Anholt Zone ORAKOTA 219639000 7827330 OXXJ2
Duration in Aarhus Harbour METTE MOLS 219000373 9112777 OZJJ
Vessels in Anholt Zone MF ANHOLT 219002731 9263368 OUZS
Great belt passages PETROPAVLOVSK 636011637 9223344 A8AO9
Great belt passages PLANET V 211219250 9087532 DGPR
PETROPAVLOVSK has left Great Belt Passage, duration = 00:00:30
Target Count (offline): 0
Target Count: 2329
Disk Space
Indbakk...
GH AIS ...
GAD v1....
about:bl...
AIS
Microsof...

## Automatic event detection

- User specified event types
- Flag to indicate status of ever
- Find vessel involved in event
- Forward event information via
  - System Integration Modu
  - SMS or email
- Speech integrated

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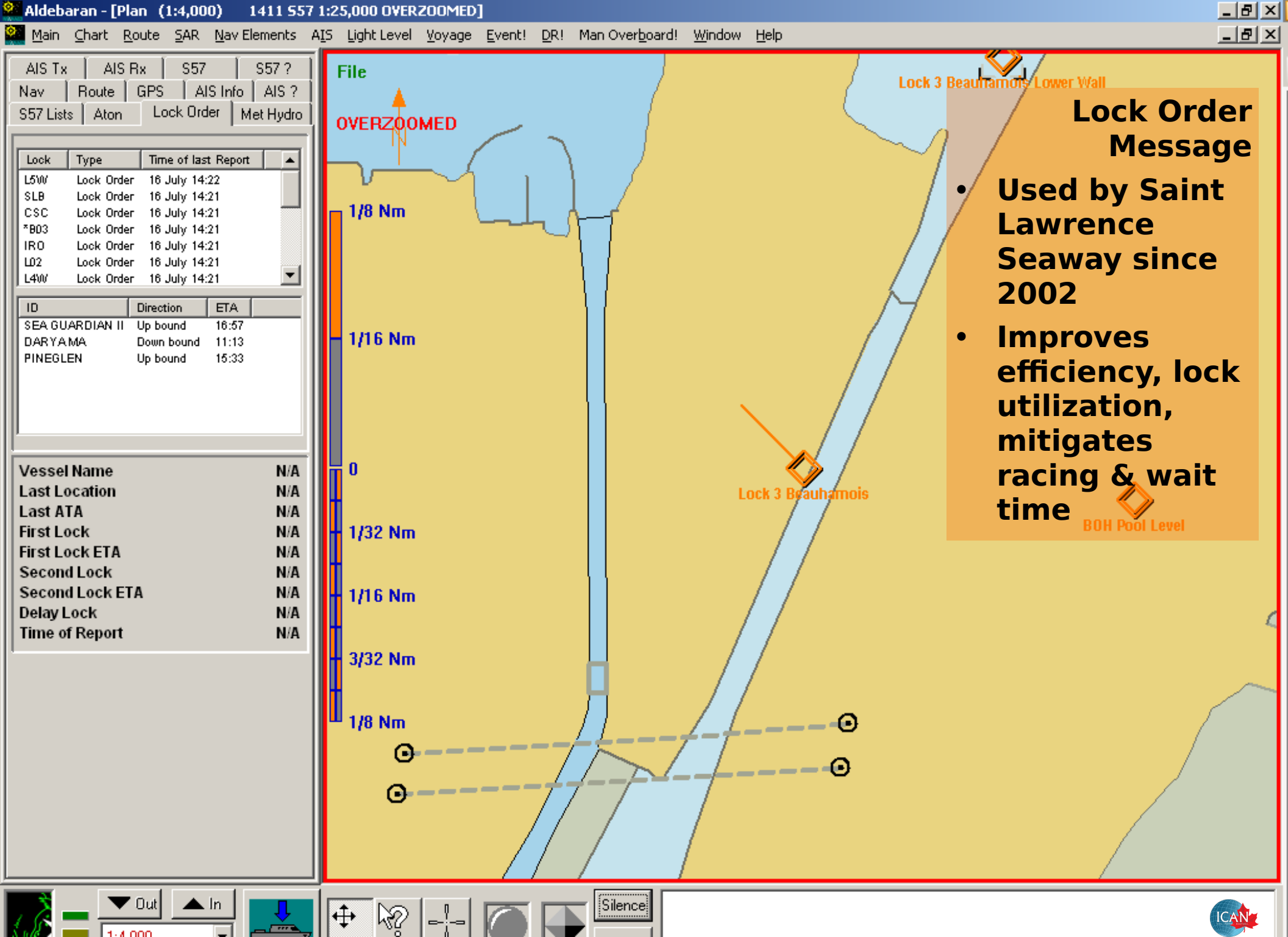
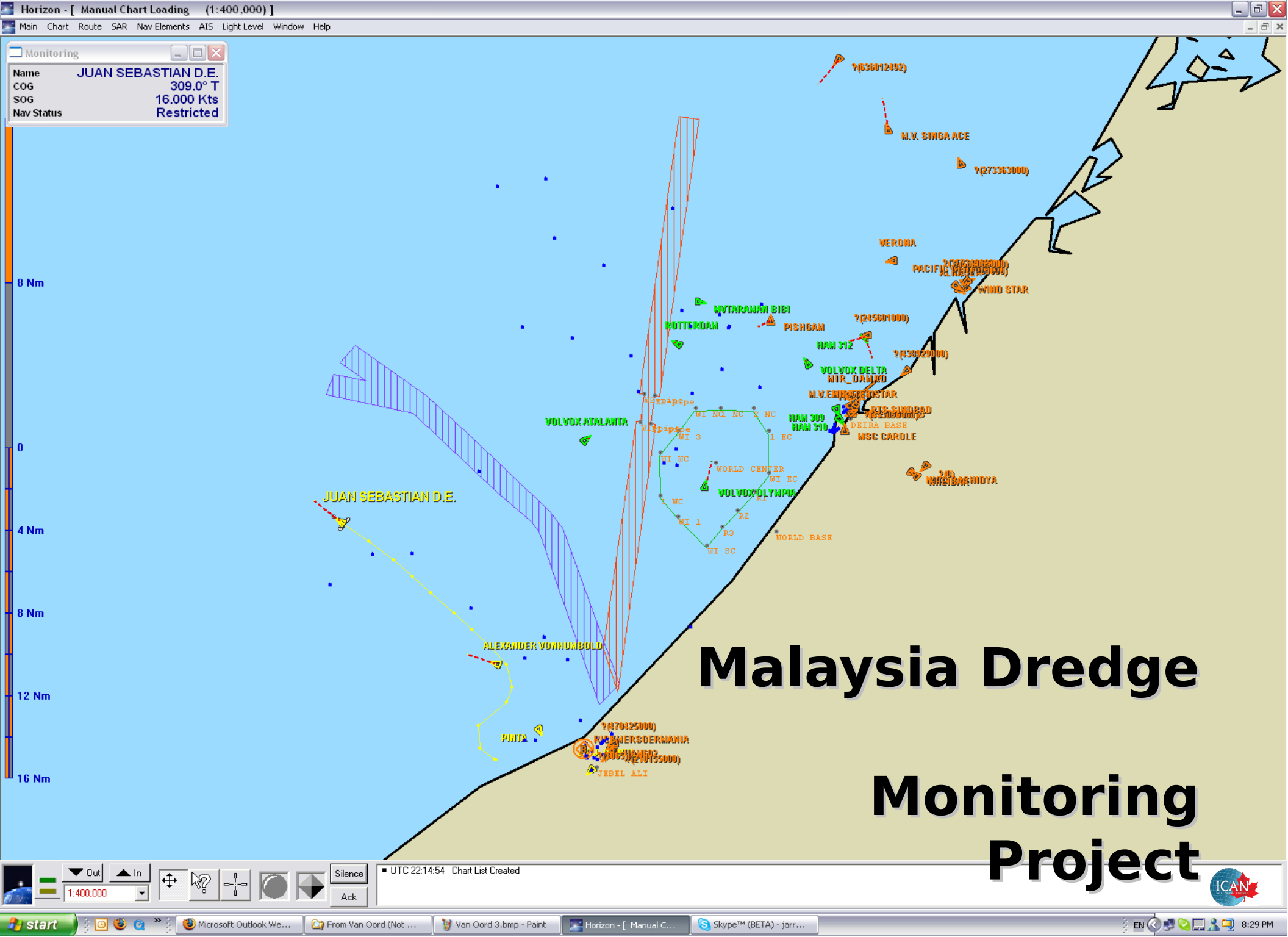

Aldebaran - [Plan (1:4,000) 1411 557 1:25,000 OVERZOOMED]
Main Chart Route SAR Nav Elements AIS Light Level Voyage Event! DR! Man Overboard! Window Help
AIS Tx AIS Rx S57 S57 ?
Nav Route GPS AIS Info AIS ?
S57 Lists Aton Lock Order Met Hydro
Lock Type Time of last Report
L5W Lock Order 16 July 14:22
SLB Lock Order 16 July 14:21
CSC Lock Order 16 July 14:21
*B03 Lock Order 16 July 14:21
IRO Lock Order 16 July 14:21
L02 Lock Order 16 July 14:21
L4W Lock Order 16 July 14:21
ID Direction ETA
SEA GUARDIAN II Up bound 16:57
DARYA MA Down bound 11:13
PINEGLEN Up bound 15:33
Vessel Name N/A
Last Location N/A
Last ATA N/A
First Lock N/A
First Lock ETA N/A
Second Lock N/A
Second Lock ETA N/A
Delay Lock N/A
Time of Report N/A
File
OVERZOOMED
1/8 Nm
1/16 Nm
0
1/32 Nm
1/16 Nm
3/32 Nm
1/8 Nm
Lock 3 Beauharnois Lower Wall
Lock 3 Beauharnois
BOH Pool Level
Lock Order Message
• Used by Saint Lawrence Seaway since 2002
• Improves efficiency, lock utilization, mitigates racing & wait time
Out
In
Silence


Horizon - [ Manual Chart Loading (1:400,000) ]
Main Chart Route SAR Nav Elements AIS Light Level Window Help
Monitoring
Name JUAN SEBASTIAN D.E.
COG 309.0° T
SOG 16.000 Kts
Nav Status Restricted
8 Nm
0
4 Nm
8 Nm
12 Nm
16 Nm
JUAN SEBASTIAN D.E.
ALEXANDER VONHUMBOLD
PINTA
VOLVOX ATALANTA
ROTTERDAM
MVTARAWAN BIBI
PISHGAM
HAM 312
VOLVOX DELTA
MIR_DAMAD
M.V.ENDEAVOUR STAR
RED SINDBAD
DEIRA BASE
HAM 309
HAM 310
MSC CAROLE
WORLD CENTER
VOLVOX OLYMPIA
WORLD BASE
M.V. SINGA ACE
VERONA
WIND STAR
JEBEL ALI
Out
In
1:400,000
Silence
Ack
UTC 22:14:54 Chart List Created
Malaysia Dredge
Monitoring
Project
start
8:29 PM

# Malaysia Dredge Monitoring Project

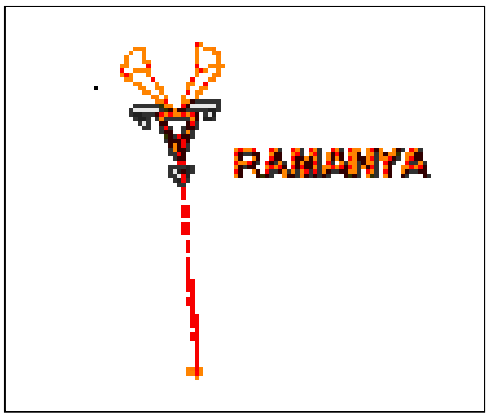
Aldebaran - [Plan (1:3,000) ]

Main Chart Route SAR Nav Elements AIS Light Level Voyage Event! DR! Man Overboard! Window Help

File

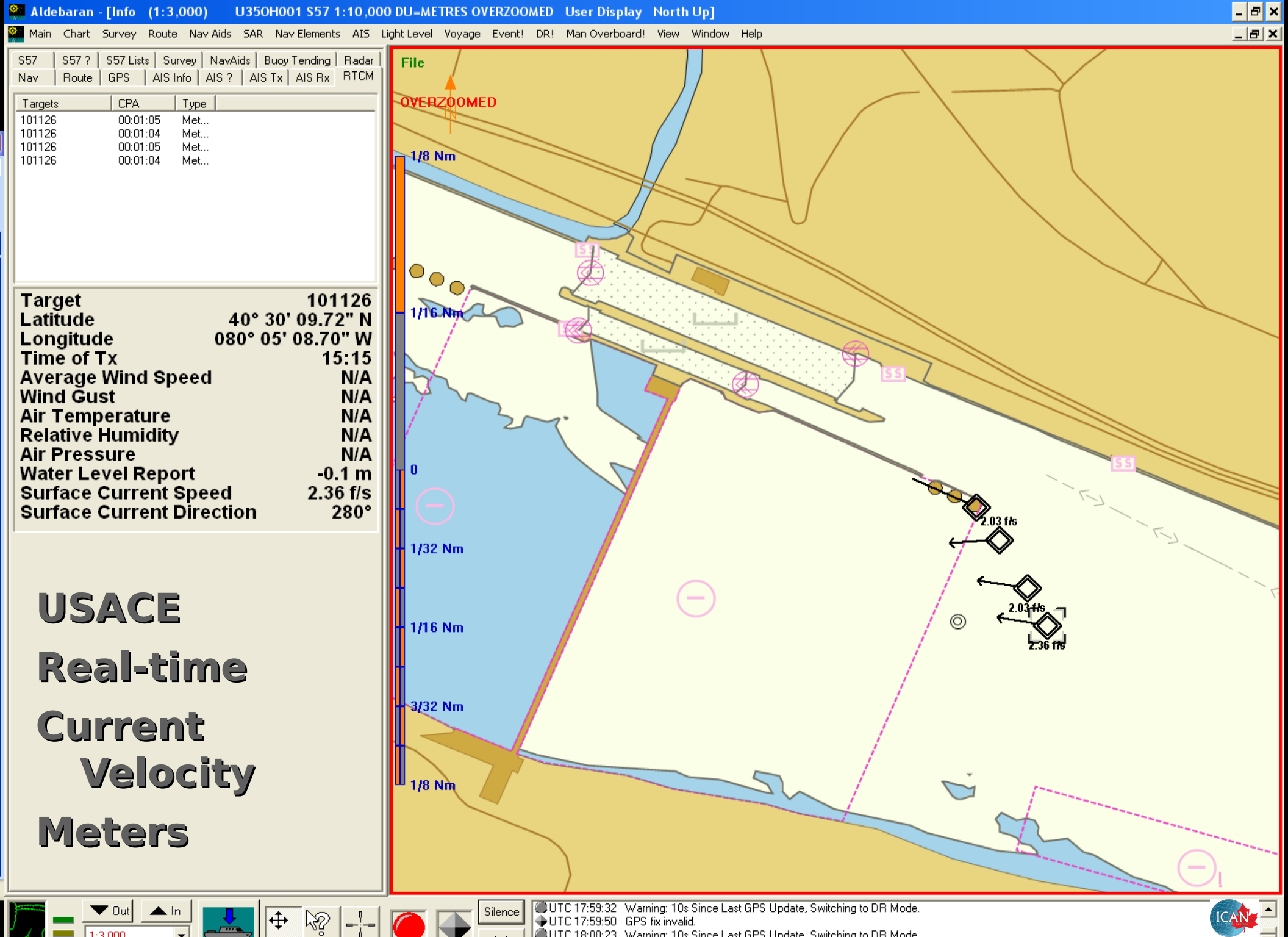
Dredge Monitoring

| | |
|---|---|
| Remote Name | RAMANYA |
| MMSI Number | 5050 |
| Call Sign | XYIV |
| Latitude | 34° 31' 12.66" N |
| Longitude | 133° 40' 14.77" E |
| Range | 6879.388 Nm |
| Bearing | 092.1° T |
| COG | 223.4° T |
| SOG | 0.000 Kts |
| ETA to Cursor Local | N/A |
| Nav Status | Under Way Engine |
| Destination | N/A |
| Channel | Own Position |
| DTE Status | Connected |
| Positional Accuracy | Low |
| Time Since Last Update | 00h 00m 02s |
| Operating Mode | Autonomous |
| Door Status | Closed |
| Time Since Last Update | 00h 00m 44s |

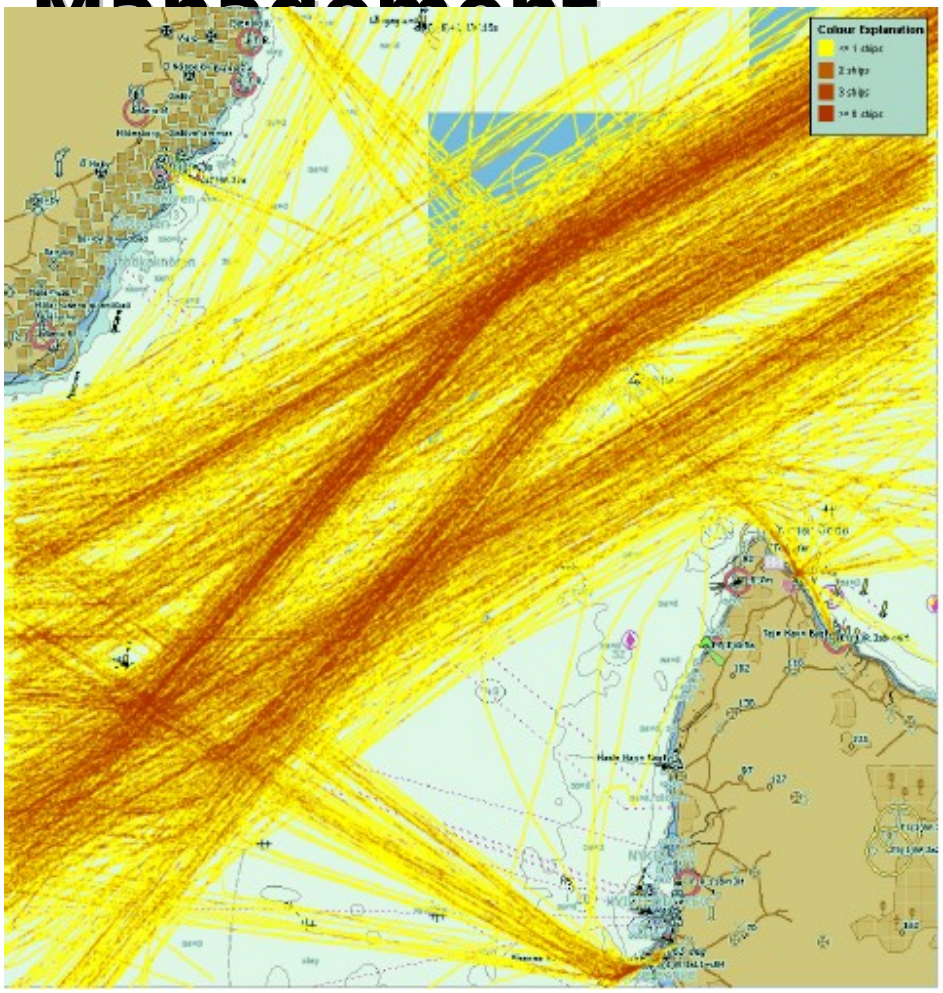


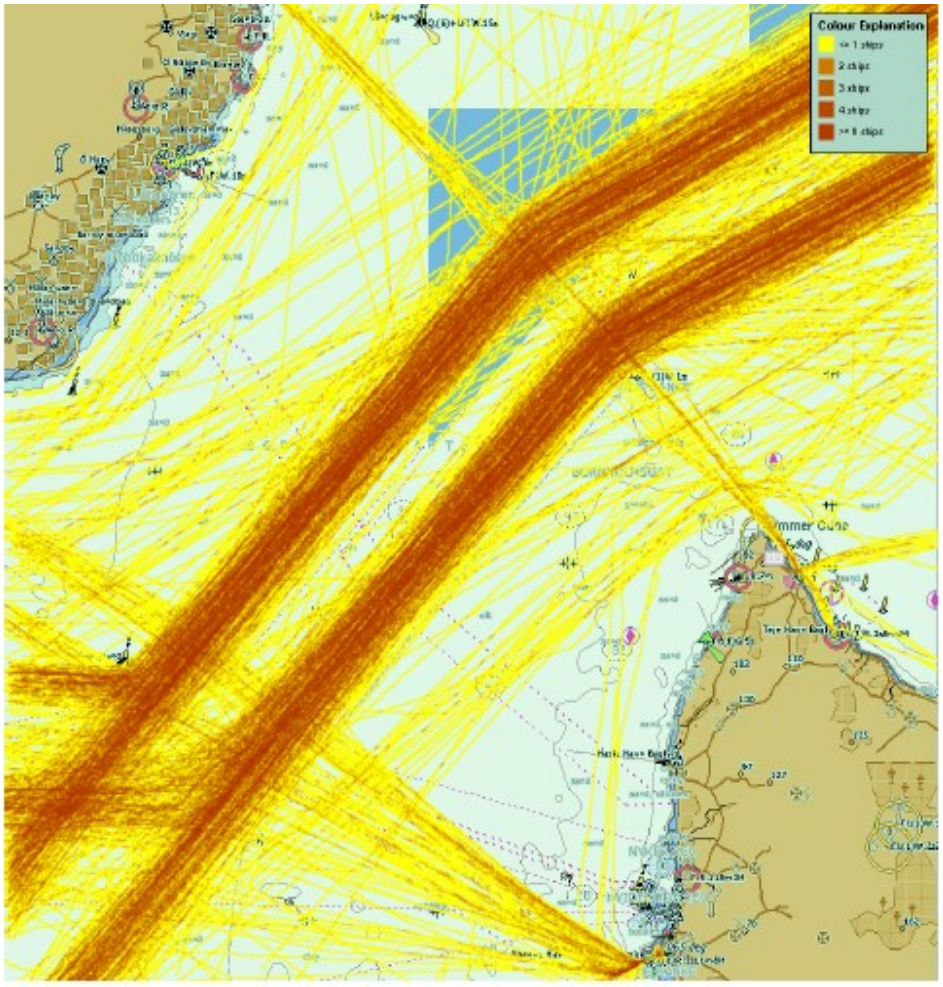

Out In 1:3,000 Silence Ack

- UTC 13:24:05 RAMANYA Hopper doors are closed.
- UTC 13:24:08 RAMANYA Hopper doors are open outside of damping area.
- UTC 13:24:09 RAMANYA Hopper doors are closed.


Aldebaran - [Info (1:3,000) U350H001 S57 1:10,000 DU=METRES OVERZOOMED User Display North Up]
Main Chart Survey Route Nav Aids SAR Nav Elements AIS Light Level Voyage Event! DR! Man Overboard! View Window Help
S57 S57 ? S57 Lists Survey NavAids Buoy Tending Radar
Nav Route GPS AIS Info AIS ? AIS Tx AIS Rx RTCM
Targets CPA Type
101126 00:01:05 Met...
101126 00:01:04 Met...
101126 00:01:05 Met...
101126 00:01:04 Met...
Target 101126
Latitude 40° 30' 09.72" N
Longitude 080° 05' 08.70" W
Time of Tx 15:15
Average Wind Speed N/A
Wind Gust N/A
Air Temperature N/A
Relative Humidity N/A
Air Pressure N/A
Water Level Report -0.1 m
Surface Current Speed 2.36 f/s
Surface Current Direction 280°
USACE
Real-time
Current
Velocity
Meters
File
OVERZOOMED
1/8 Nm
1/16 Nm
0
1/32 Nm
1/16 Nm
3/32 Nm
1/8 Nm
2.03 f/s
2.03 f/s
2.36 f/s
Out In
Silence
UTC 17:59:32 Warning: 10s Since Last GPS Update, Switching to DR Mode.
UTC 17:59:50 GPS fix invalid.

# AIS Traffic Analysis & Vessel Traffic Management




The before and after implementation of traffic separation scheme

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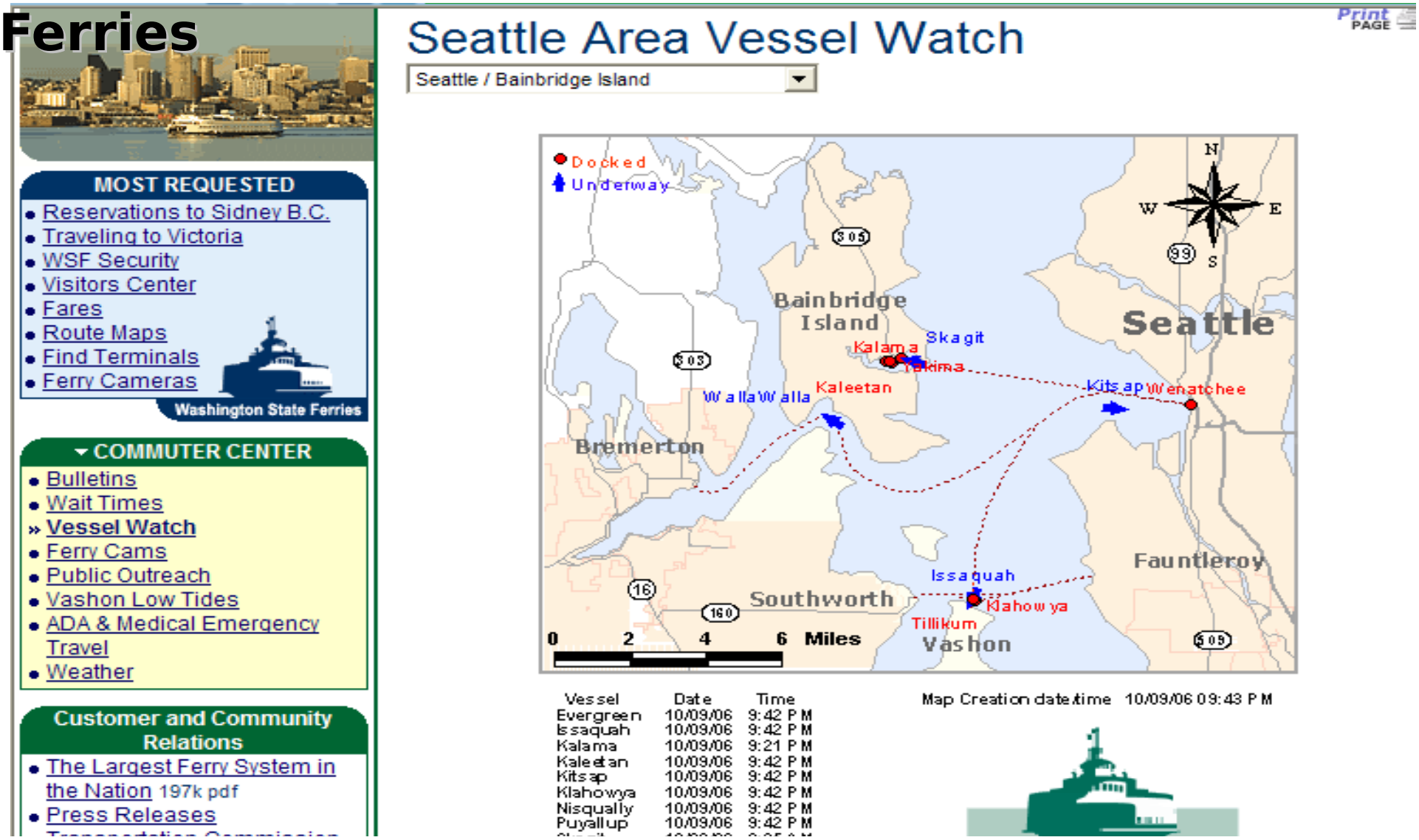
# Industry is using AIS – Washington St. Ferries

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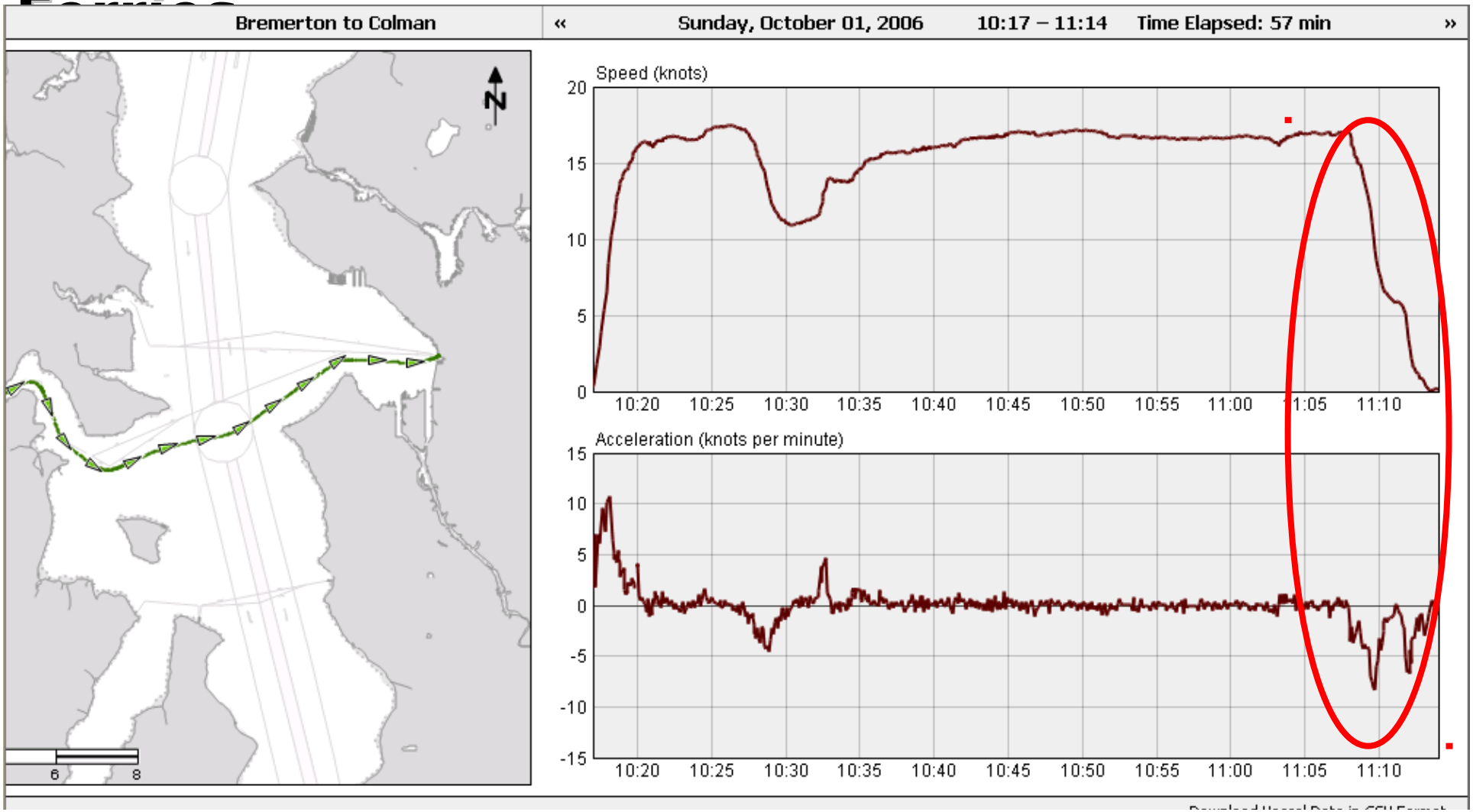
# Industry is using AIS – Washington St. Ferries




Acceleration/deceleration graphs shows areas of opportunity for fuel savings

Homeland Security

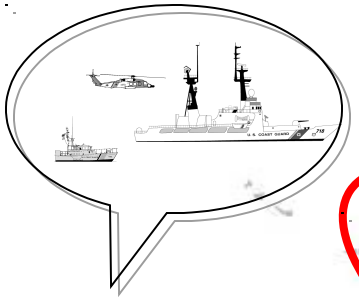
# European Multi-service Meteorological Awareness system

## Weather Warnings EMMA – Shore to Ship)

# European Multi-service Meteorological Awareness System **Signal Status – Shore to Ship**

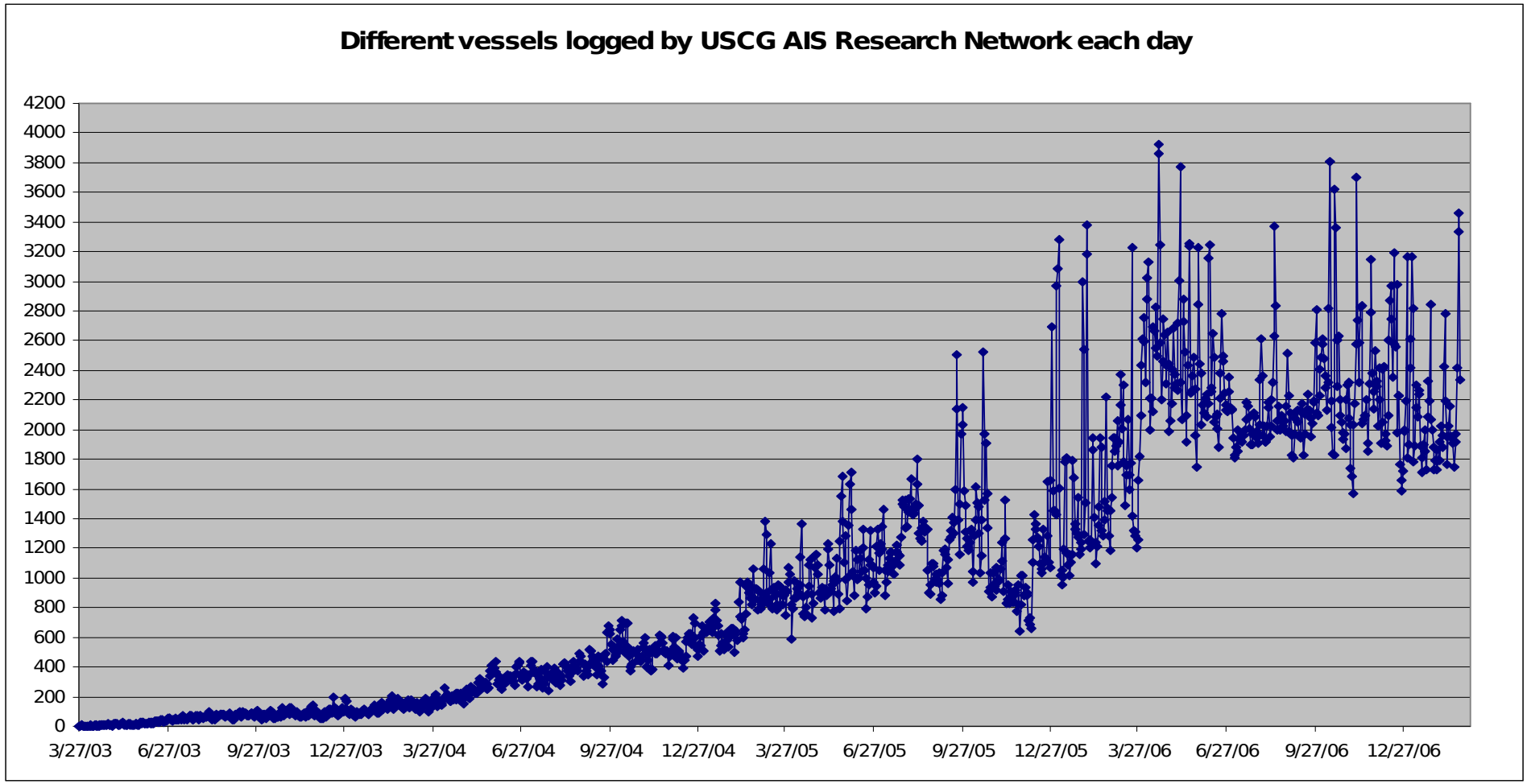
# Current U.S. AIS Capability

notional coverage



- USCG VTS
  - NY/NJ, LMR, HOU/GAL, Tampa, Port Arthur, Berwick Bay, LA/LB, SF, Puget and Prince Wm. Sound
- Joint Harbor Operations Centers (USCG/USN JHOC)
- MOA with St. Lawrence Seaway
- USCG R&D AIS Efforts
  - Prototype AIS installations and network
  - Coverage analysis and evaluation
  - Evaluating AIS & VHF voice communications compatibility
- Alaska Secure Passive AIS
- Gulf of Mexico Offshore Platforms
- NOAA Weather Buoys with AIS
- Commercial Low Earth Orbit Satellite-Orbcomm launch

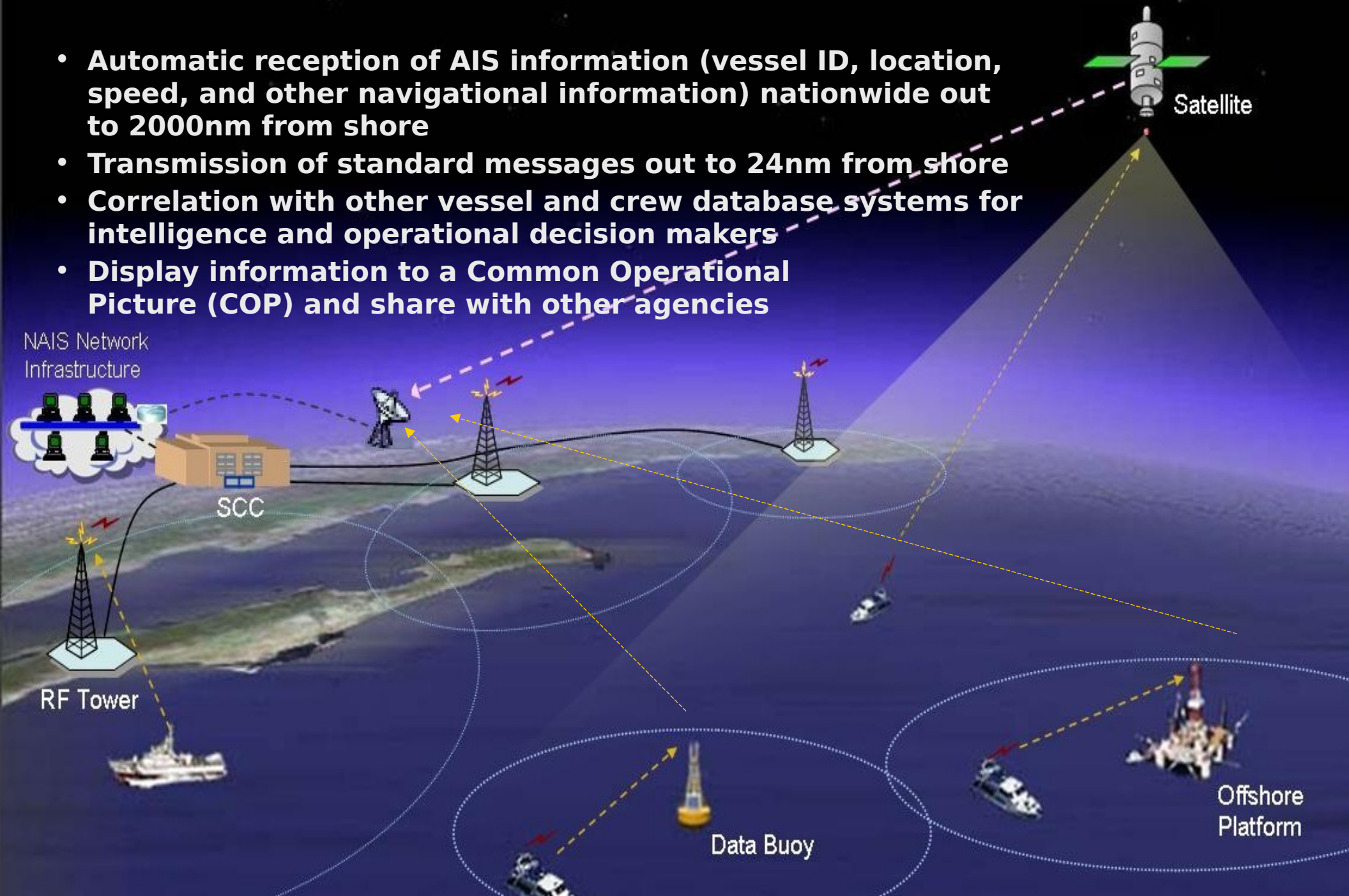
# Daily number of vessels tracked between 3/03 and 3/07
# Coast Guard R&D Center AIS Network



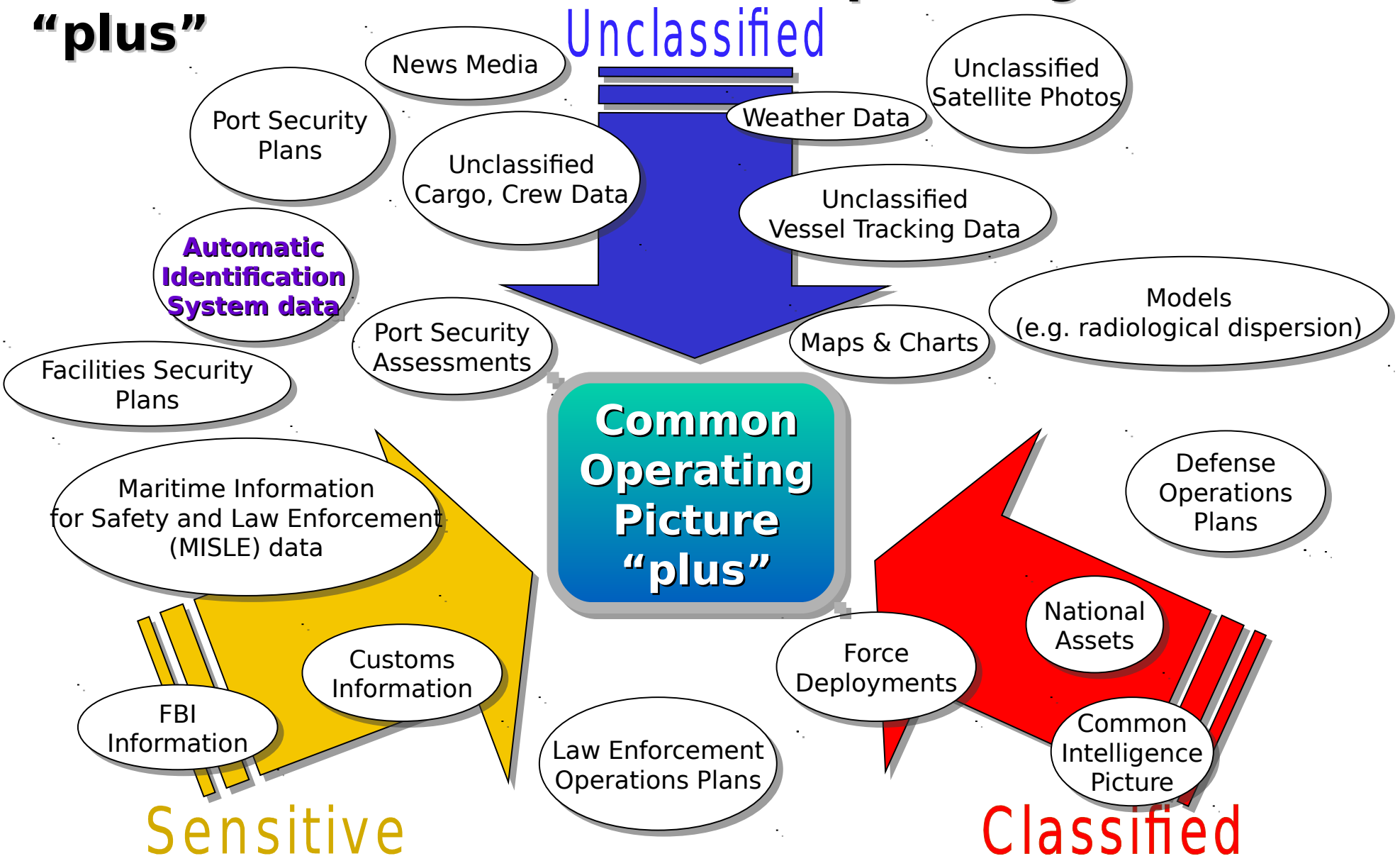

Homeland Security

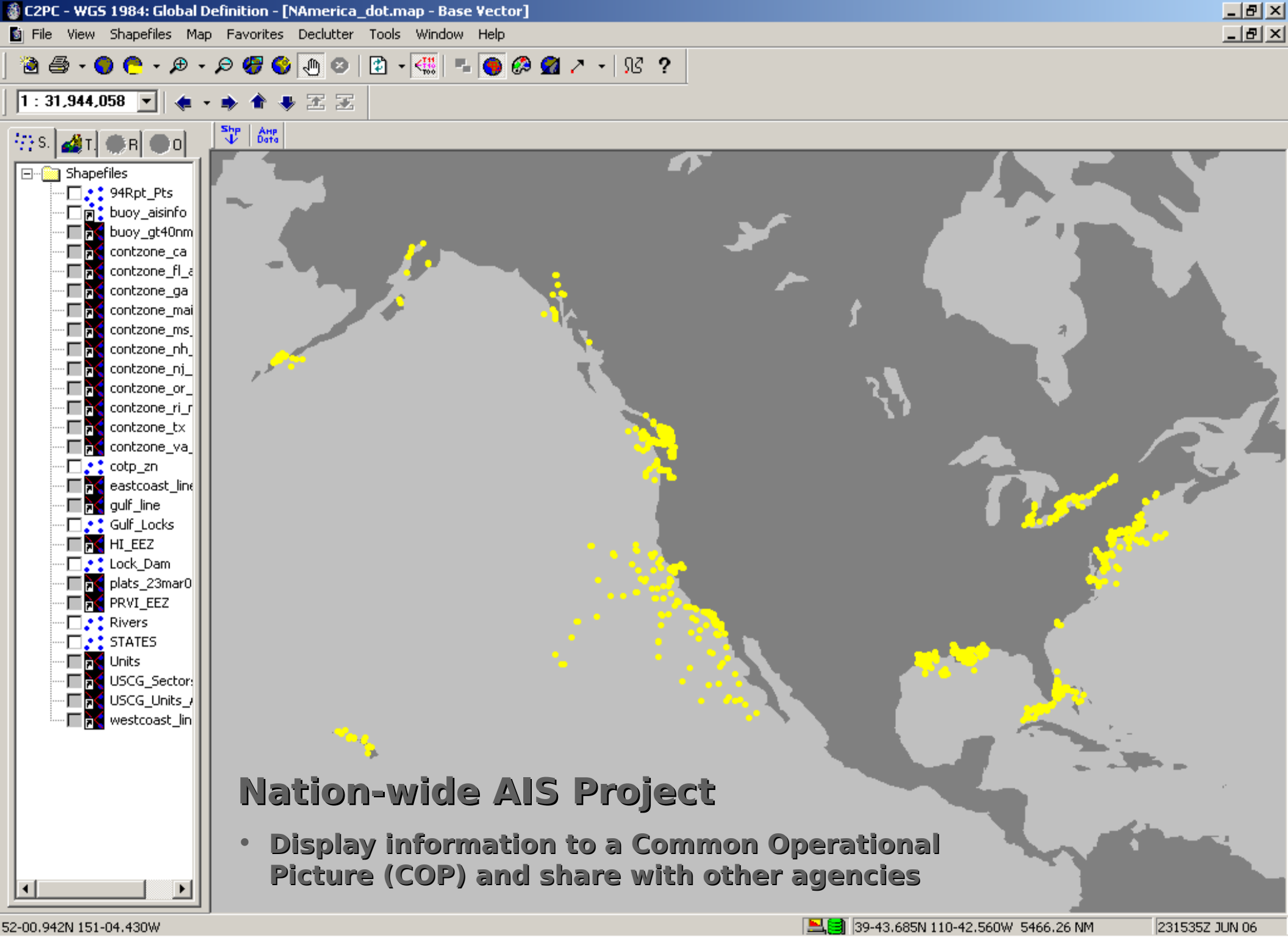
# Nation-wide AIS Project Overview

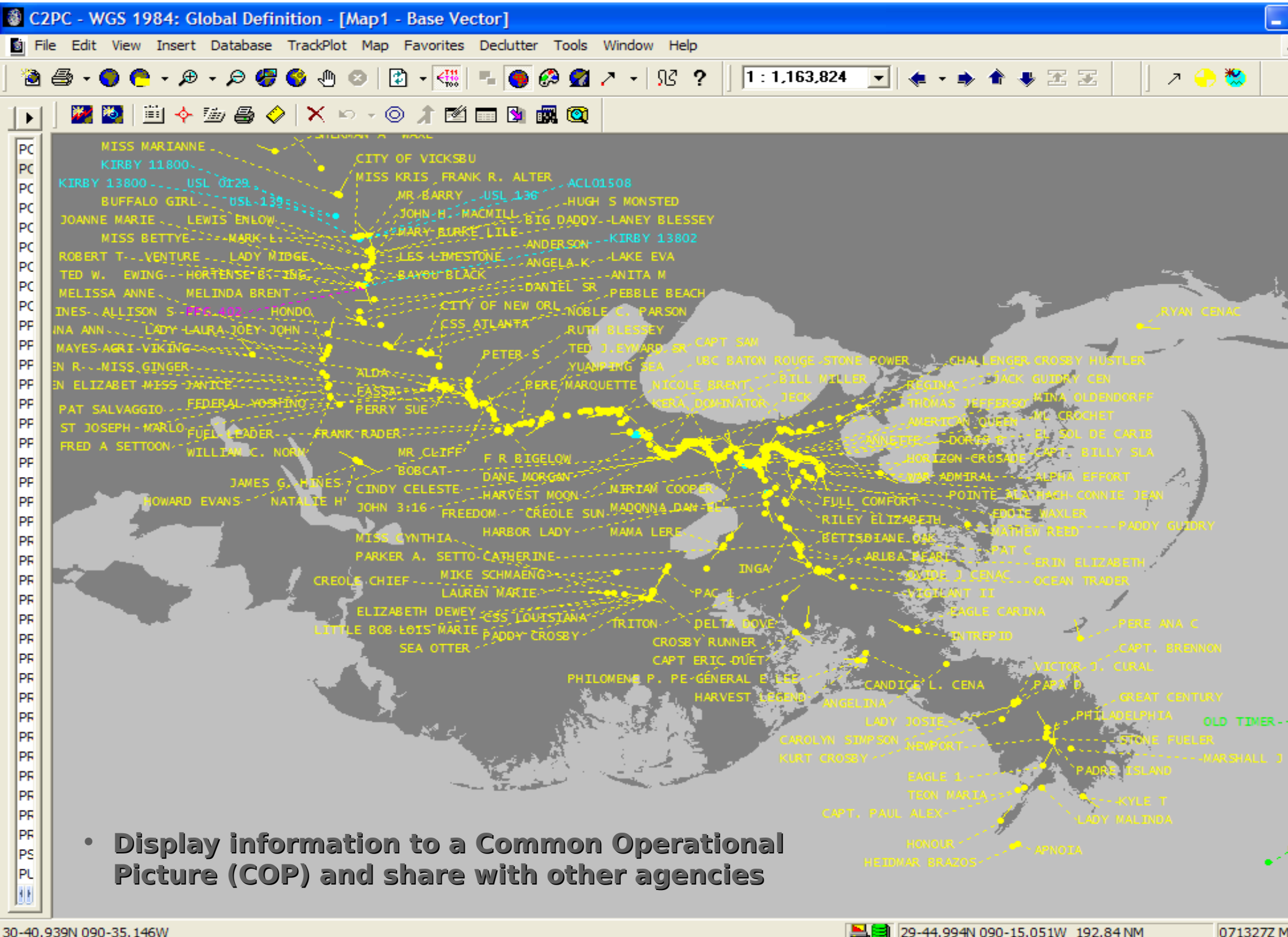
- **Automatic reception of AIS information (vessel ID, location, speed, and other navigational information) nationwide out to 2000nm from shore**
- **Transmission of standard messages out to 24nm from shore**
- **Correlation with other vessel and crew database systems for intelligence and operational decision makers**
- **Display information to a Common Operational Picture (COP) and share with other agencies**

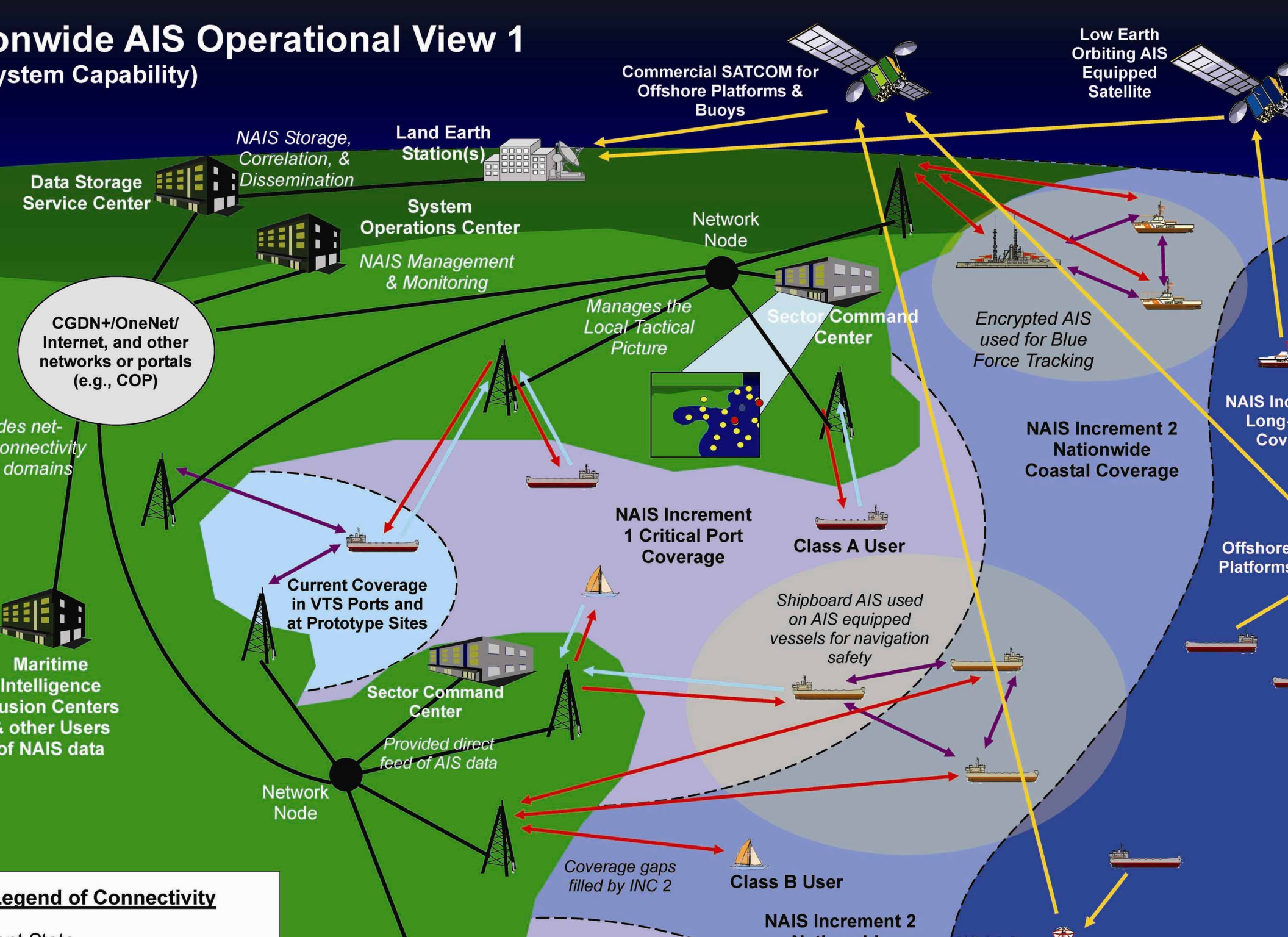


# One known need: Common Operating Picture "plus"

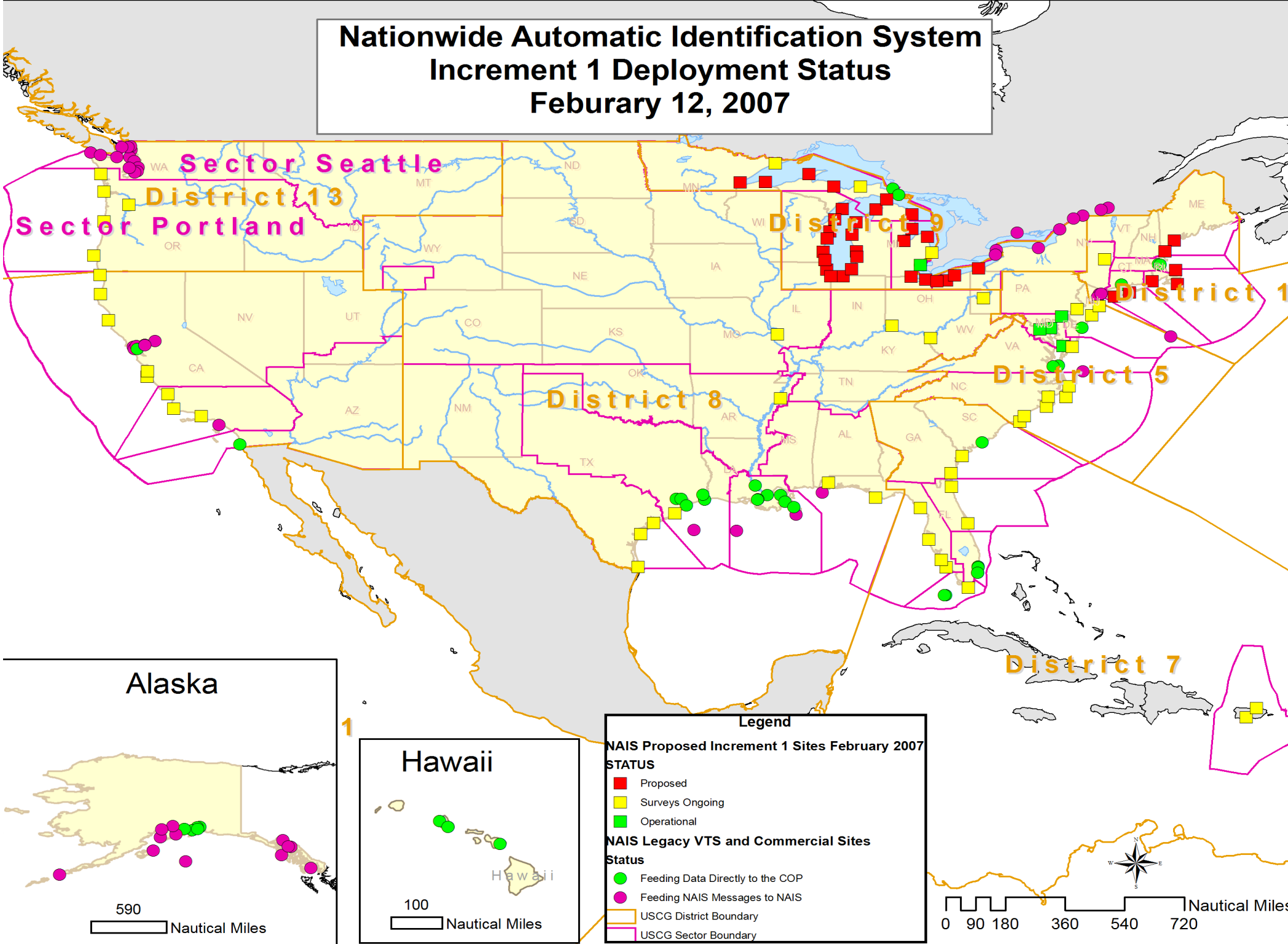


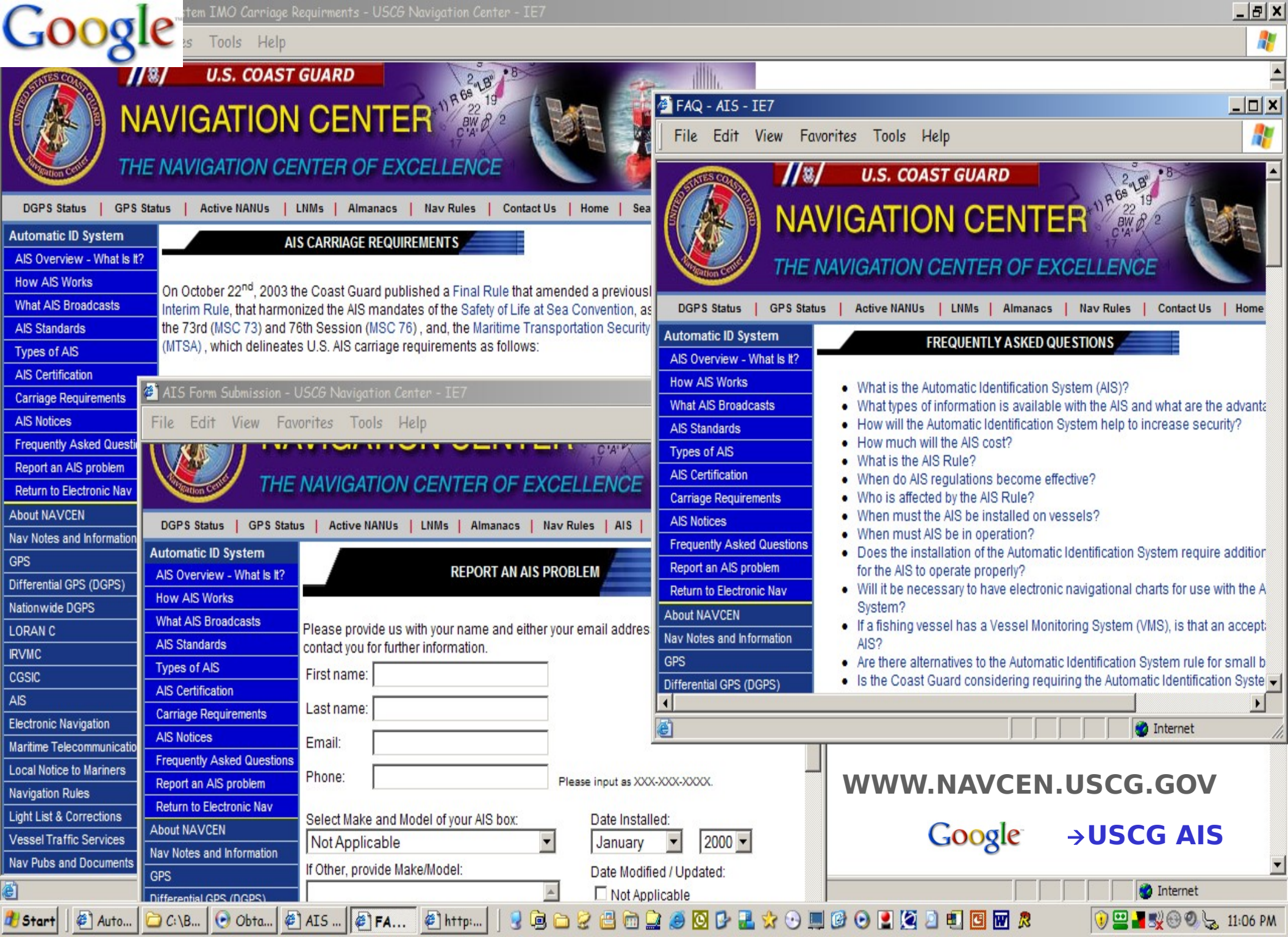

C2PC - WGS 1984: Global Definition - [NAmerica_dot.map - Base Vector]
File View Shapefiles Map Favorites Declutter Tools Window Help
1 : 31,944,058
Shapefiles
94Rpt_Pts
buoy_aisinfo
buoy_gt40nm
contzone_ca
contzone_fl_a
contzone_ga
contzone_mai
contzone_ms_
contzone_nh_
contzone_nj_
contzone_or_
contzone_ri_r
contzone_tx
contzone_va_
cotp_zn
eastcoast_line
gulf_line
Gulf_Locks
HI_EEZ
Lock_Dam
plats_23mar0
PRVI_EEZ
Rivers
STATES
Units
USCG_Sector
USCG_Units_A
westcoast_lin
Nation-wide AIS Project
• Display information to a Common Operational Picture (COP) and share with other agencies
52-00.942N 151-04.430W
39-43.685N 110-42.560W 5466.26 NM
231535Z JUN 06


C2PC - WGS 1984: Global Definition - [Map1 - Base Vector]
File Edit View Insert Database TrackPlot Map Favorites Declutter Tools Window Help
1 : 1,163,824
MISS MARIANNE
KIRBY 11800
KIRBY 13800
USL 0129
BUFFALO GIRL
USL 1395
JOANNE MARIE
LEWIS ENLOW
MISS BETTYE
MARK-L
ROBERT T
VENTURE
LADY MIDGE
TED W. EWING
HORTENSE B
ING
MELISSA ANNE
MELINDA BRENT
INES
ALLISON S
HONDO
INA ANN
LADY LAURA JOEY JOHN
MAYES AGRI-VIKING
N R
MISS GINGER
N ELIZABET
MISS JANICE
PAT SALVAGGIO
FEDERAL YOSHINO
ST JOSEPH
MARIO
FRED A SETTOON
FUEL LEADER
WILLIAM C. NORM
FRANK RADER
JAMES G. HINES
HOWARD EVANS
NATALIE H'
CITY OF VICKSBU
MISS KRIS
FRANK R. ALTER
ACL01508
MR BARRY
USL 136
HUGH S MONSTED
JOHN H. MACMILL
BIG DADDY
LANEY BLESSEY
MARY BURKE LILE
KIRBY 13802
ANDERSON
LES LIMESTONE
LAKE EVA
ANGELA K
BAYOU BLACK
ANITA M
DANIEL SR
PEBBLE BEACH
CITY OF NEW ORL
NOBLE C. PARSON
CSS ATLANTA
RUTH BLESSEY
TED J.EYWARD ER
CAPT SAM
PETER S
YUANPING SEA
UBC BATON ROUGE
STONE POWER
ALDA
FASSA
PERRY SUE
PERE MARQUETTE
NICOLE BRENT
KERA DOMINATOR
BILL MILLER
JECK
CHALLENGER
CROSBY HUSTLER
JACK GUIDRY CEN
REGINA
THOMAS JEFFERSO
MINA OLDENDORFF
AMERICAN QUEEN
M CROCHET
ANNETTE
DORIS B
EL SOL DE CARIB
HORIZON CRUSADE
CAPT. BILLY SLA
WAR ADMIRAL
ALPHA EFFORT
POINTE ALA HACH
CONNIE JEAN
EDDIE WAXLER
MATHEW REED
PADDY GUIDRY
BETISBIANE OAK
PAT C
ARUBA PEARL
ERIN ELIZABETH
OCEAN TRADER
VIGILANT II
EAGLE CARINA
INTREPID
PERE ANA C
CAPT. BRENNON
VICTOR J. CURAL
CANDICE L. CENA
PAPA D
GREAT CENTURY
PHILADELPHIA
OLD TIMER
STONE FUELER
MARSHALL J
PADRE ISLAND
KYLE T
LADY MALINDA
APNOIA
HONOUR
HEIDMAR BRAZOS
EAGLE 1
TEON MARIA
CAPT. PAUL ALEX
CAROLYN SIMPSON
NEWPORT
KURT CROSBY
ANGELINA
LADY JOSIE
HARVEST LEGEND
PHILOMENE P.
PE GENERAL E LEE
CROSBY RUNNER
CAPT ERIC DUET
DELTA DOVE
TRITON
PAC 1
INGA
CSS LOUISIANA
PADDY CROSBY
LITTLE BOB
LOIS MARIE
SEA OTTER
ELIZABETH DEWEY
LAUREN MARIE
MIKE SCHMAENG
CREOLE CHIEF
PARKER A. SETTO
CATHERINE
MISS CYNTHIA
HARBOR LADY
MAMA LERE
FREEDOM
CREOLE SUN
MADONNA DAN-EL
JOHN 3:16
CINDY CELESTE
HARVEST MOON
MIRIAM COOPER
DANE MORGAN
BOBCAT
MR CLIFF
F R BIGELOW
FULL COMFORT
RILEY ELIZABETH
RYAN CENAC
• Display information to a Common Operational Picture (COP) and share with other agencies
30-40.939N 090-35.146W
29-44.994N 090-15.051W 192.84 NM
071327Z M


onwide AIS Operational View 1
ystem Capability)
Commercial SATCOM for Offshore Platforms & Buoys
Low Earth Orbiting AIS Equipped Satellite
NAIS Storage, Correlation, & Dissemination
Land Earth Station(s)
Data Storage Service Center
System Operations Center
NAIS Management & Monitoring
Network Node
CGDN+/OneNet/ Internet, and other networks or portals (e.g., COP)
des net-onnectivity domains
Manages the Local Tactical Picture
Sector Command Center
Encrypted AIS used for Blue Force Tracking
NAIS Increment 2 Nationwide Coastal Coverage
NAIS Increment 1 Critical Port Coverage
Class A User
Current Coverage in VTS Ports and at Prototype Sites
Shipboard AIS used on AIS equipped vessels for navigation safety
Maritime Intelligence usion Centers & other Users of NAIS data
Sector Command Center
Provided direct feed of AIS data
Network Node
Coverage gaps filled by INC 2
Class B User
NAIS Increment 2
Offshore Platforms
Legend of Connectivity

# Nationwide Automatic Identification System
# Increment 1 Deployment Status
# Feburary 12, 2007




Google
stem IMO Carriage Requirments - USCG Navigation Center - IE7
Tools Help
U.S. COAST GUARD
NAVIGATION CENTER
THE NAVIGATION CENTER OF EXCELLENCE
DGPS Status | GPS Status | Active NANUs | LNMs | Almanacs | Nav Rules | Contact Us | Home | Sea
Automatic ID System
AIS Overview - What Is It?
How AIS Works
What AIS Broadcasts
AIS Standards
Types of AIS
AIS Certification
Carriage Requirements
AIS Notices
Frequently Asked Questi
Report an AIS problem
Return to Electronic Nav
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Differential GPS (DGPS)
Nationwide DGPS
LORAN C
IRVMC
CGSIC
AIS
Electronic Navigation
Maritime Telecommunicatio
Local Notice to Mariners
Navigation Rules
Light List & Corrections
Vessel Traffic Services
Nav Pubs and Documents
AIS CARRIAGE REQUIREMENTS
On October 22nd, 2003 the Coast Guard published a Final Rule that amended a previous
Interim Rule, that harmonized the AIS mandates of the Safety of Life at Sea Convention, as
the 73rd (MSC 73) and 76th Session (MSC 76) , and, the Maritime Transportation Security
(MTSA) , which delineates U.S. AIS carriage requirements as follows:
AIS Form Submission - USCG Navigation Center - IE7
File Edit View Favorites Tools Help
THE NAVIGATION CENTER OF EXCELLENCE
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REPORT AN AIS PROBLEM
Please provide us with your name and either your email addres
contact you for further information.
First name:
Last name:
Email:
Phone:
Please input as XXX-XXX-XXXX.
Select Make and Model of your AIS box:
Not Applicable
Date Installed:
January
2000
If Other, provide Make/Model:
Date Modified / Updated:
Not Applicable
FAQ - AIS - IE7
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Nav Notes and Information
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Differential GPS (DGPS)
FREQUENTLY ASKED QUESTIONS
What is the Automatic Identification System (AIS)?
What types of information is available with the AIS and what are the advanta
How will the Automatic Identification System help to increase security?
How much will the AIS cost?
What is the AIS Rule?
When do AIS regulations become effective?
Who is affected by the AIS Rule?
When must the AIS be installed on vessels?
When must AIS be in operation?
Does the installation of the Automatic Identification System require additior
for the AIS to operate properly?
Will it be necessary to have electronic navigational charts for use with the A
System?
If a fishing vessel has a Vessel Monitoring System (VMS), is that an accept
AIS?
Are there alternatives to the Automatic Identification System rule for small b
Is the Coast Guard considering requiring the Automatic Identification Syste
Internet
WWW.NAVCEN.USCG.GOV
Google →USCG AIS
Internet
Start
Auto...
C:\B...
Obta...
AIS ...
FA...
http:...
11:06 PM

# United States Coast Guard

## Office of Navigation Systems

NEW

**********

******

Jorge.Arroyo@uscg.mil

1-202-372-1563

www.navcen.uscg.gov

U.S. Coast Guard
Office of Navigation Systems
2100 Second St. SW
Washington, DC 20953

Homeland Security

# What AIS broadcasts

- MARITIME MOBILE SERVICE INDENTIFIER
- UNIVERSAL TIME STAMP (GPS)

### *Dynamic Data*
*-every 2-10 seconds per speed and course change*

- POSITION & ACCURACY (+/-10m)
- COURSE OVER GROUND
- SPEED OVER GROUND
- HEADING
- RATE OF TURN

- VESSEL IMO NUMBER
- COLREG NAVIGATION STATUS

### *Static & Voyage Data*
*-every 6 minutes or upon change*

- VESSEL NAME & CALL SIGN
- VESSEL TYPE & DIMMENSIONS

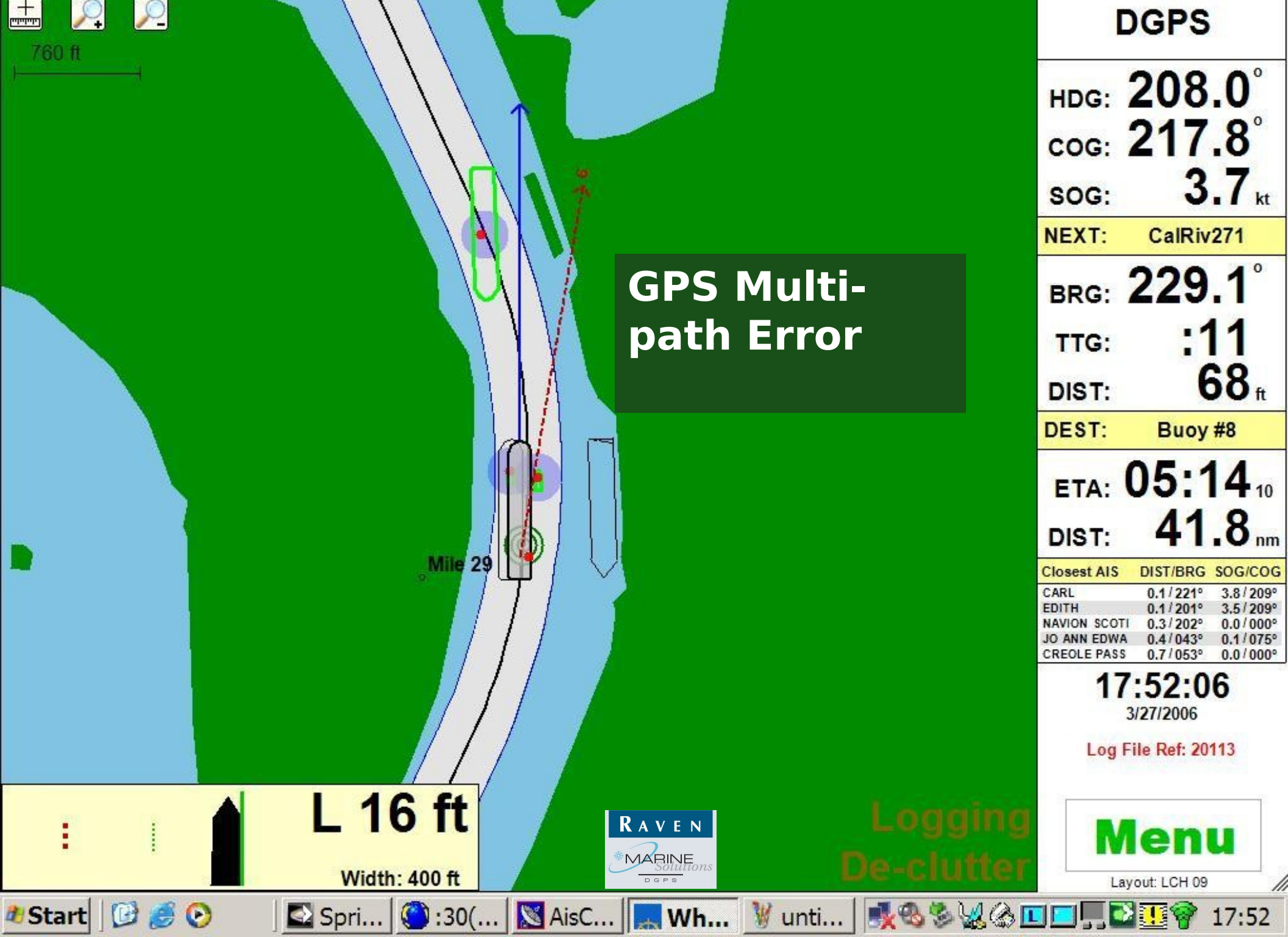
- STATIC DRAFT
- HAZARDOUS CARGO FLAG
- DESTINATION & ETA

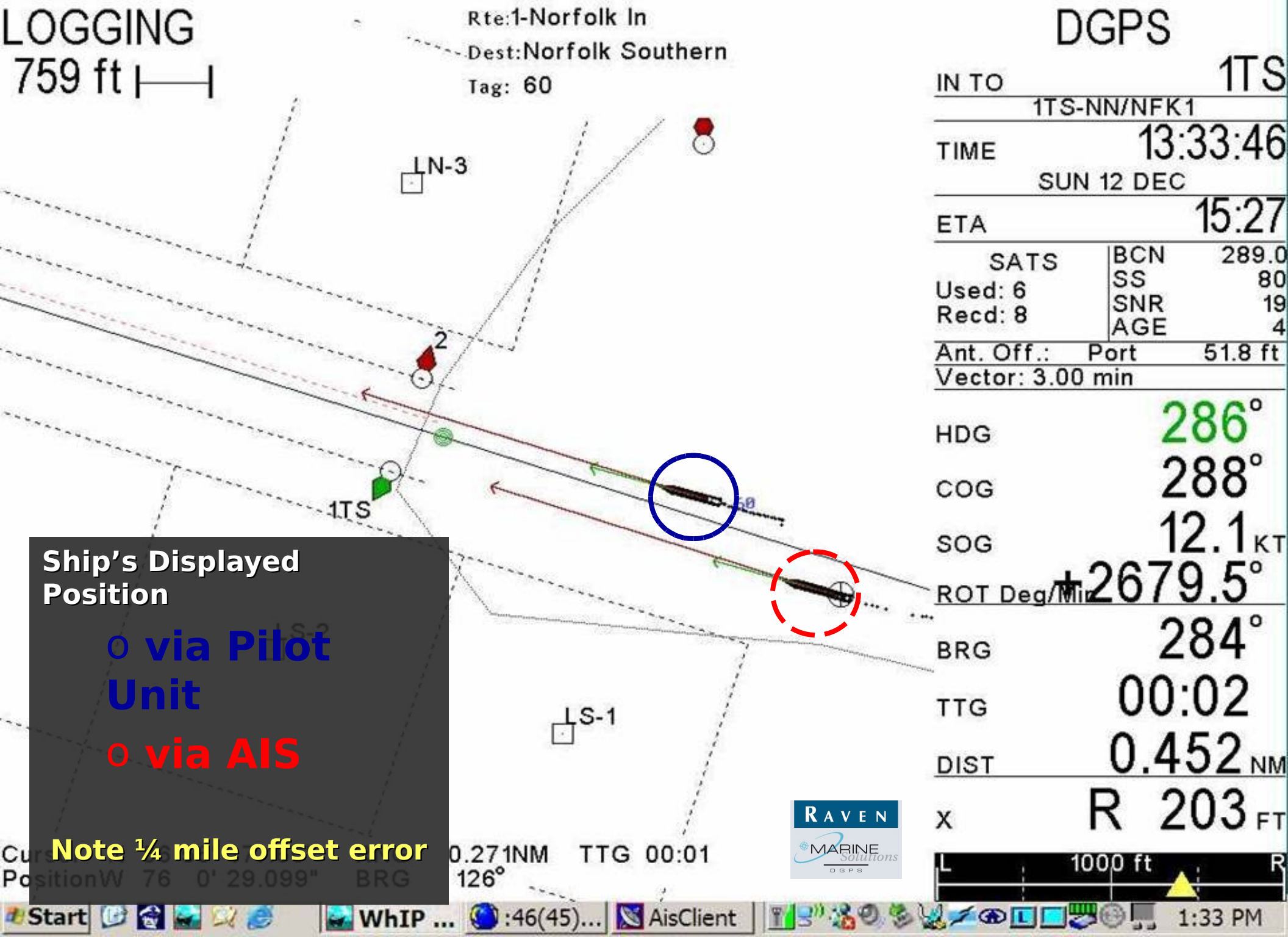
### *Safety Related & Binary Applications*
- SHORT TEXT MESSAGING  < 156 characters
- DATA MESSAGING & BINARY APPLICATIONS

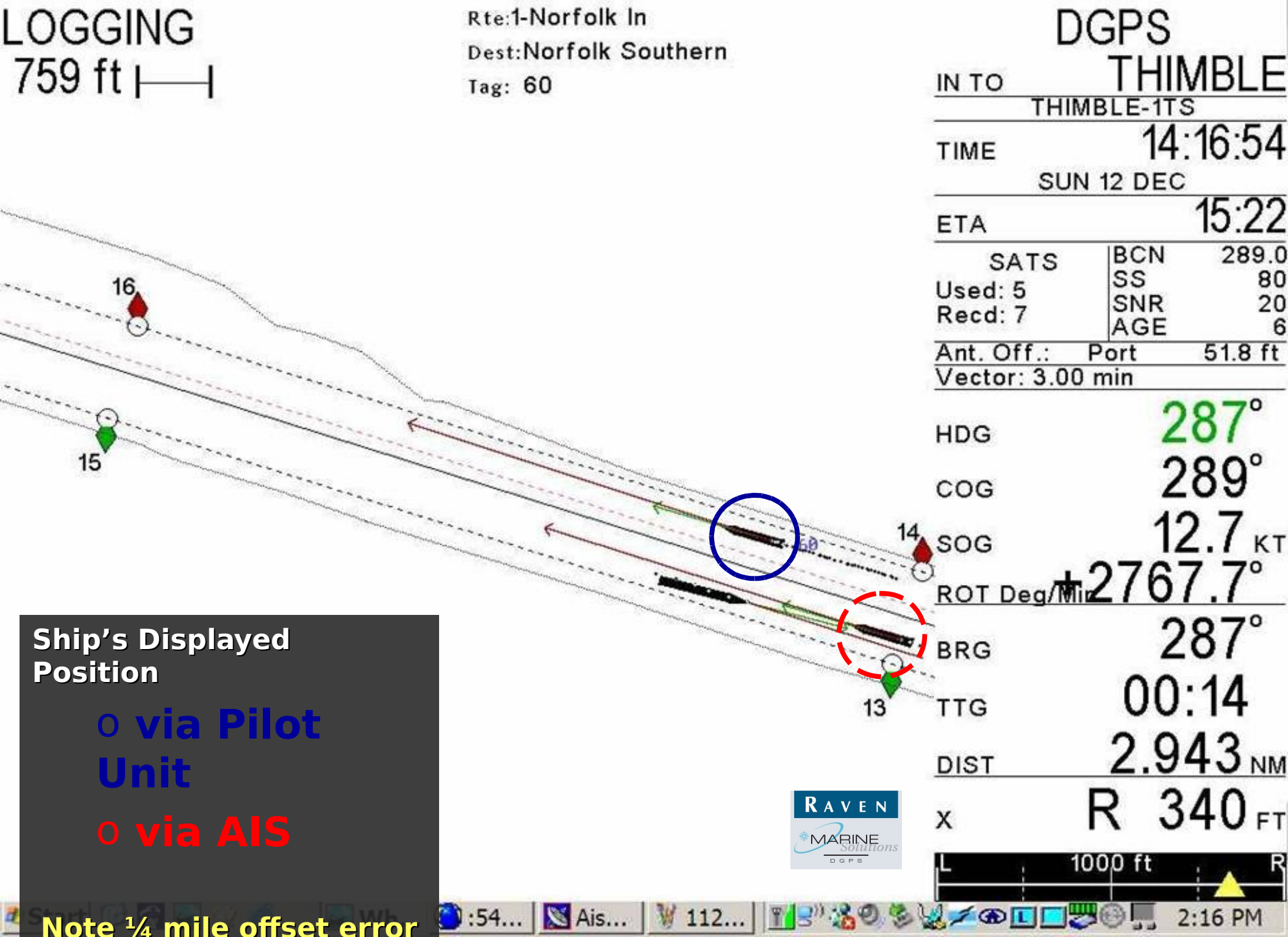
### *Weather & Hydrological Information-*
- NOAA Physical Oceanographic Real Time System
- NWS-Real-time weather buoy (C-MAN station)
- USACE Real-time Current Meter System (RTCM)

### *Vessel Traffic Service (VTS)-*
- ATON Discrepancies
- Distress Alerts
- Urgent Notices & Warnings
- Traffic Advisories
- Radar Overlay / Pseudo-targets
- Additional Hydro & Meteorological Information

### *Other possible uses-*
- Aids to Navigation
- Search and Rescue
- Port Partners
- Lock/Canal operations
- … endless opportunities!


760 ft
GPS Multi-path Error
Mile 29
L 16 ft
Width: 400 ft
RAVEN
MARINE Solutions
DGPS
Logging
De-clutter
DGPS
HDG: 208.0°
COG: 217.8°
SOG: 3.7 kt
NEXT: CalRiv271
BRG: 229.1°
TTG: :11
DIST: 68 ft
DEST: Buoy #8
ETA: 05:14 10
DIST: 41.8 nm
Closest AIS DIST/BRG SOG/COG
CARL 0.1 / 221° 3.8 / 209°
EDITH 0.1 / 201° 3.5 / 209°
NAVION SCOTI 0.3 / 202° 0.0 / 000°
JO ANN EDWA 0.4 / 043° 0.1 / 075°
CREOLE PASS 0.7 / 053° 0.0 / 000°
17:52:06
3/27/2006
Log File Ref: 20113
Menu
Layout: LCH 09
Start
Spri...
:30(...
AisC...
Wh...
unti...
17:52


LOGGING
759 ft
Rte:1-Norfolk In
Dest:Norfolk Southern
Tag: 60
LN-3
2
1TS
LS-1
DGPS
IN TO 1TS
1TS-NN/NFK1
TIME 13:33:46
SUN 12 DEC
ETA 15:27
SATS
Used: 6
Recd: 8
BCN 289.0
SS 80
SNR 19
AGE 4
Ant. Off.: Port 51.8 ft
Vector: 3.00 min
HDG 286°
COG 288°
SOG 12.1 KT
ROT Deg/Min +2679.5°
BRG 284°
TTG 00:02
DIST 0.452 NM
X R 203 FT
L 1000 ft R
Ship's Displayed Position
o via Pilot Unit
o via AIS
Note ¼ mile offset error
0.271NM TTG 00:01
126°
RAVEN MARINE Solutions DGPS
Start
WhIP ...
:46(45)...
AisClient
1:33 PM


LOGGING
759 ft
Rte:1-Norfolk In
Dest:Norfolk Southern
Tag: 60
DGPS
IN TO THIMBLE
THIMBLE-1TS
TIME 14:16:54
SUN 12 DEC
ETA 15:22
SATS
Used: 5
Recd: 7
BCN 289.0
SS 80
SNR 20
AGE 6
Ant. Off.: Port 51.8 ft
Vector: 3.00 min
HDG 287°
COG 289°
SOG 12.7 KT
ROT Deg/Min +2767.7°
BRG 287°
TTG 00:14
DIST 2.943 NM
X R 340 FT
L 1000 ft R
16
15
14
13
Ship's Displayed Position
o via Pilot Unit
o via AIS
Note ¼ mile offset error
RAVEN MARINE Solutions DGPS
:54...
Ais...
112...
2:16 PM

# NAIS - System Context Diagram

Commercial Vessels

Government Vessels

Recreational Vessels

Cutters and Deepwater Assets

Aids to Navigation

SAR Aircraft

VHF Data Link

Rx/Tx Platform

Rx/Tx Platform

Rx Platform

Rx Platform

Rx Platform

Rx/Tx

Rx/Tx

Rx

Rx

Rx

LAN

Data Processing

Storage/ Archive

WAN & Diverse Remote Site Connectivity

**Coast Guard Systems**
- C2
- Law Enforcement
- Intelligence
- Marine Safety
- Waterways Management

**External Users**
- Coast Guard
- DHS
- Government
- Non-government

System Operations Center

NAIS Scope

Homeland Security